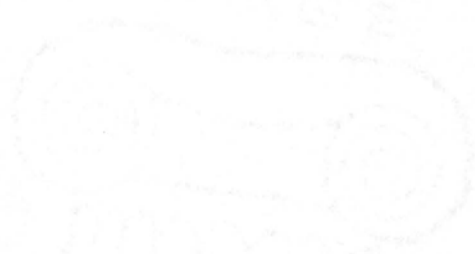


25¢ COTTON  
AND FREE

May 3 1965



B 5/15

7/9/3

S-IVB ULLAGE ENGINES - ROCKETDYNE/GEMINI The third MSFC Qual engine was returned to Rocketdyne for repair of pin hole gas leak at the chamber pressure tap. A replacement engine has been received. Delivery on all engines (4) for MSFC Qual program is complete.

Delays in receipt of repair parts for MSFC vibration equipment has caused a week's delay in initiation of vibration phase of the MSFC Qual program. ✓

J-2 ENGINE A 374 second main stage test was accomplished on the S-IVB Battleship April 27. ✓ After 20 seconds duration, the engine was released for gimbal system checkout and maximum mixture ratio was initiated. Engine premature cutoff was attributed to a stage hydraulic system overtemperature; consequently, gimbaling was not accomplished. The engine was operated at the maximum mixture ratio for 115 seconds.

Production engines J2019 and J2020 were delivered to DAC May 1. Engine 2019 was delivered six days ahead of the schedule established in the March 10 S-IVB Program Review, and engine 2020, 20 days ahead of schedule. Engine J2020 is the first deliverable engine with restart capability. It will be utilized in the S-IVB Battleship program. ✓

The first Flight Rating Test engine, J2022, is presently undergoing hot fire acceptance testing. ✓

A cluster engine test was attempted on the S-II Battleship on May 1. The test was aborted when ignition was not detected on one engine. The cause of failure was a faulty ignition detector probe that shorted electrically. ✓

F-1 ENGINE F-1 engine thermal insulation problems are under investigation. Since late delivery of insulation for S-IC-1 will require work-around, to accommodate the Boeing Modifications, and since documentation is lacking or incomplete, Mr. Kuers was asked to assist by assigning one engineer full time to work with all parties involved in minimizing the impact. In response to this request, Mr. Dishman of R-ME has been assigned for four months as a full time thermal insulation coordination engineer, and he is now at Rocketdyne and North American Los Angeles Division investigating the situation at the design and manufacturing points. ✓

The previously reported turbine manifold problem on the assembly for engine F-3014 caused missed engine delivery milestones for April and May. (One engine behind each month). Engine F-3015 was accepted at the end of April. ✓

The milestone for hot firing of an engine with thermal insulation was established for April 30. It will be accomplished less than one week late. Engine 014 is on the stand with its insulation cocoon and has undergone drop tests whereby LOX is dropped to the turbopump to simulate a hold condition; thus determining temperature change in the cocoon during a countdown hold. ✓

RL10 ENGINE The boost pump recirculation scheme for Atlas/Centaur Vehicle AC-8 has been revised as a result of testing on the dual-position "E-5" test stand at P&WA. Preliminary indications are that the scheme will consist of a reduced boost pump volute bleed line and a recirculation line from upstream of the engine propellant valves back to the tank. Both recirculation ducts will have diffusers in the tank. ✓



NOTES 5-3-65 CLINE

B 5/15

July 13

1. S-IVB BATTLESHIP TEST PREMATURELY TERMINATED: A scheduled full duration firing (470 sec) was terminated at 374 seconds due to overheating of the hydraulic oil. ✓ The violation of oil temperature redline was caused by the accumulator-reservoir high pressure relief valve failing in open position. The shaft seal of the main pump also failed. This was the first hot test of the hydraulic system; failures are being investigated. ✓
2. INSTRUMENT UNIT ENVIRONMENTAL CONTROL SYSTEM (ECS) HARDWARE DELIVERY BEHIND SCHEDULE: Delivery date of all flight ECS components to IBM for S-IU-201 is late; the last component is now scheduled to be delivered 6-15-65. There will be no schedule impact on 201. ✓
3. S-IC LOX PRESSURE VOLUME COMPENSATORS (PVC'S) BEHIND SCHEDULE: Preflight certification testing (PFCT) on the LOX PVC's has not been completed; original PFCT completion date was July 1964. A task force of specialists from Manufacturing Engineering Laboratory and Propulsion and Vehicle Engineering Laboratory is assisting the vendor in the problem areas of design and fabrication. ✓

NOTES 5/3/65 CONSTAN

1w 5/3  
B 5/15

1. S-I/IB

Hydraulic Package - As a result of contamination found in the hydraulic system of S-I-8, CSD removed all of the accumulators from S-I-10. After disassembly, one unit was found to have a scored wall, which is believed to cause shredding of the "O" rings. In coordination with MSFC-Huntsville, CSD and the vendor (Cadillac Gage) parts are being made available to support the immediate needs, while further analysis of the cause and corrective actions develop. ✓

Operations Problems - A series of meetings with CSD have been held to discuss the operations problems which have resulted to damage to flight hardware (engines, wiring and tanks). Messrs. Lowrey, Trahern, Sheldon, et.al., are making sincere efforts to correct deficiencies by improved training, access control, analysis of operations, etc. Dr. Farish, MSFC, has given assistance, and the "Manned Flight Awareness" van is now at Michoud. ✓

Spider Beam Qualification Test - The failure of the spider beam was reported last week. CSD has been analyzing the cause of failure and possible fixes. MSFC personnel will arrive Monday, May 3, to consult with CSD on the proposed fixes. We cannot say today what the production schedule impact will be, but it appears that a minimal schedule impact fix is possible. ✓

2. S-IC

Hydrostatic Testing - The "D" vehicle fuel tank hydrostatic test did not take place on schedule, due to test fixture and preparatory problems. It is being tested starting April 30, 1965. We estimate this to be three weeks behind schedule, which has the effect of delaying "F" vehicle delivery to the Cape. Possibilities to overcome this potential delay are being explored. ✓



NOTES 5-3-65 DANNENBERG

B 5/15

125/3

1. Pre-Flight Operations Analysis, Saturn V - It is planned to add an additional task to the Analysis to cover the compilation of a report on program impact resulting from major catastrophies, such as explosion on the pad or crash of the Guppy. This study has been proposed by Dr. Mueller but must be approved by R-DIR and I-DIR before it can be included in the analysis. ✓

2. Mission Directives - Final concurrence has been provided to IO on the Saturn SA-201 Mission Directive. IO has been furnished data from the labs for preparation of the SA-202 Mission Directive. The Mission Directive for SA-10/Pegasus "C" has been published on 3-8-65. ✓

3. Pogo Instability Measurement on Saturn IB and V - IO and R&DO will meet the week of 5-3-65 to discuss measurement requirements and plans to install instrumentation on Saturn IB & V vehicles to measure longitudinal oscillations. These measurements are required for input to the Pogo studies underway at MSFC. ✓

4. PRINCE System - R-QUAL presented a new concept for operation of the PRINCE program at MSFC. The program will be limited to storage and retrieval of data on selected and critical Apollo parts. Outputs will be qualified parts list, parts application lists, and failure rate data. It was proposed that the system be called APRINCE (Apollo Parts Reliability Information Center). ✓

5. Experiment Coordination - Members of the MSFC Experiments Review Board have been informed of the possibility of two Little Joe II vehicles becoming available for experiments. An expression of interest was requested. If enough interest exists, a meeting will be arranged with General Dynamics/Convair and NASA/WSMR people to explore possibilities. ✓

6. Air Force Visit (Titan III-C) - Representatives of the Air Force Space Systems Division and the Aerospace Corp. visited us to discuss man-rating of launch vehicles. In the course of the conversation, two interesting facts came out:

a. The Titan III-C carrying the Gemini B on top of the MOL will have a total TNT equivalent of 6,000 lbs. (less than 1%) including the solids which contribute only a small fraction to the liquid core equivalent. (Other AF TNT equivalent estimates are more conservative.) Therefore, ejection seats will be flown. ✓

b. The Titan III-C will have full polar orbital capability for manned and unmanned payloads from West Coast launch facility. (This factor appears more significant than cost, simplicity, etc., for comparison with IB, since most military and technological missions will prefer polar orbit.) KD

*Saturn IB seems to have a good polar orbital capability from the Cape (Southern route). B*

1. Personnel Office delaying actions critically retard us. Someone said the national spotlight is on MTF, but MSFC classification experts sure eclipse it, insisting that our key positions be GS-14. Warren Johnson, S-II Stage Office Chief, does not want to be permanently assigned. Heimburg and I do not yet have a suitable replacement. By Personnel Office restraints, we cannot interview either higher or lower graded R&DO applicants for the positions we have established. Management action is necessary to get more flexibility and support in all personnel actions. We hope Wible can bring more moon-consciousness to the office, and get us out from under the dark umbra.

2. Suggested visit of President Johnson - The lock, lower canal system, stage shuttle barge, with the S-II Stage weight simulator on board, should be in readiness by July 1, Herb Evans says. It would be timely for President Johnson or Vice President Humphrie to come to the site particularly for labor relations aspects. Bringing the barge through the lock would be a meaningful operational demonstration. Might also be worked into an Independence Day celebration. ✓

3. VIP Visitors - Gorman, O'Connor and Balch spent three days analyzing our potential to meet schedule. Bill Ricke, Paul Styles, Jerry Gaffney and Alen McCone, (former DOD labor expert, now working for Day and Zimmerman) were here two days to review the union situation. Bill Guy, Executive Vice President, Rocketdyne, paid a call, and Capt. Tracy, CO. NAS, New Orleans, came over to discuss possibilities of a Navy Bombing Range in the NE corner of the buffer zone. He showed six mile diameter circle with traffic patterns which reputedly never get closer than three miles to our fee area. I doubt if the Navy can get sufficient leases for this, but told him Henry Dyer would be available to discuss operational limitations if their actions look successful. We had our busiest week in the field of Public Affairs with 13 briefings and tours conducted for 467 persons. This included 20 press visitors. To illustrate that we are getting plenty of activation help from Huntsville, our Public Affairs made 137 reservations at various hotels and motels. ✓

4. A decision has been made to make both the AE and R&A Contracts prime to NASA. ✓

5. Communications - Present interim telephone system is rapidly approaching complete saturation, with 354 lines of 390 maximum capacity in use. In addition, the 508 extension phones presently in use are overloading the line finders to the extent that an estimated three attempts must be made to complete one call. The new centrex switching equipment cannot be accelerated and will not be available until August. We are taking all possible action to relieve this problem as much as possible. ✓

6. Personnel from the Western Contracts Management Region and Patrick Air Force Base representing the Air Force, are making all necessary arrangements to bring activation oriented QA personnel on board. We anticipate three of these people will be on board by the week of May 3, 1965. ✓

7. The GE/MTSO FY 66 proposal has been evaluated by the government and negotiations are scheduled to begin May 4. ✓

8. The first program review of test stand B-2/S-IC-T requirements will be held at MTF on May 7. ✓

I'll discuss this with GEM, Bonnie, Please remind me (Wash.), 17 May) B



B5/15

Tw 5/3

1. Orbital Debris: DAC presented results of studies on common propulsion system solutions for IB and V orbital debris at MSFC, 4/22/65. They recommended that two "tailor made" 20" spherical solid propulsion rocket motors attached to S-IVB thrust structure be utilized to dispose of IB debris and that two existing "off loaded" 26" solid motors, with same attachment, be utilized for Saturn V. Total disposal system weights are: IB 596# and V 1120#. SCAR is 48# in each. ✓ Total cost for these systems (9 Saturn IB and 13 V vehicles) was estimated by DAC to be around \$10,000,000. A short in-house meeting was held after presentation to discuss and recommend plan of action on orbital debris question. R&DO and IO agreed on following: (a) R&DO will evaluate DAC proposal and present to IO a solid propulsion system solution to Orbital Debris problem; (b) IO will request that DAC study and propose a solution utilizing existing Auxiliary Propulsion Systems in combination with onboard hybrid systems; (c) IO will request that Rocketdyne study and propose a solution utilizing restart or blowdown on J-2 engines; and (d) IO will present study results from (a), (b) and (c) to NASA Hq. for decision. ✓

2. S-IVB LH2 SLOSH Baffle Design: At meeting with DAC, 4/15/65, S-IVB LH2 tank baffle design was discussed for 501, 203, and subs. Baffle design selected for reducing slosh during boost phase, to less than 1/2" amplitude, is a 25" wide single ring. An earlier MSFC three baffle design which provided a wider time range of damping was preferred by DAC and MSFC, however, it was agreed that additional damping coverage didn't offset the resultant installation problems. Control studies revealed large slosh amplitude during S-IVB coast. Accordingly, deflector baffles will also be installed in LH2 tanks of S-IVB/203, 501 and subs. Further studies will investigate (1) need for additional lox slosh control at injection, and (2) coupling of APS and slosh during coast.

3. Minimax Control Theory: Brief discussion of minimax control research problem was presented to you in April 29 Research Achievements Review. Our research work in this area was started approx. 3 years ago. It is interesting to note that Russians started publishing information in same area in June 1964. ✓

4. Personnel: We are faced with a serious personnel crisis in the laboratory. I have just learned that four key individuals in Guidance & Flight Mechanics Branch have been interviewed by STL (Houston). One (Mr. L. Hooper) has already accepted for a 20% increase in salary with a promise of an additional 10% increase in six months and another 10% increase at the end of a year. This branch is one of the key branches in the laboratory. It is responsible for guidance theory and implementation methods, conducting investigations in vehicle performance and optimization methods, and conducting investigations in mission profiles for lunar and interplanetary missions. Mr. Hooper is lead man in laboratory in performing the many studies in mission analysis required for the Saturn/Apollo program. We cannot lose these experienced people in a highly competitive field and hope to continue performing to standards exhibited in the past.

E.F.  
I presume  
you are  
talking  
about  
those  
nylon  
slosh  
baffles.

B

Shea has given STL an Apollo systems engineering contract.

→ Harry G. Suggest you call STL management and ask them to stop these raids. Such things are definitely harmful to good future cooperation with STL. B

"this was done - Mueller talked to Mueller."



B 5/15

7w 5/3

1. S-1B/V ELECTRICAL SUPPORT EQUIPMENT: The first FACI (First Article Configuration Inspection) was attempted Friday, April 23, 1965, on the S-1VB Simulator for the S-1B Breadboard Facility. Although the equipment was not accepted because the documentation did not match the equipment, the FACI was successful in the sense that it uncovered basic problems which have since been resolved. The second FACI, conducted on April 28, was more successful and GE personnel were better prepared. The Count Clock for the IBM-IU Checkout Station was accepted. ✓
2. S-1C GROUND SUPPORT EQUIPMENT: A letter of agreement which requires Boeing to maintain custody of R-QAL GSE during stage test and checkout has been signed by representatives of the Government and Boeing. Coordination is currently in progress with Boeing to establish the details of how Boeing will fulfill the obligations of this letter. ✓
3. S-1C-500FS INSTRUMENT UNIT: An ESE delivery meeting has been scheduled by Astrionics to determine when S-IU-500FS ESE will be delivered to this Laboratory. Installation of two slave magnetic tape stations for the RCA-110 complex is in progress. Final acceptance has been accomplished on the 500FS RCA-110A with the exception of two magnetic tape stations. ✓
4. RELIABILITY EFFORTS: The results of a study by ARINC on the occurrence of fire and explosions within other missile systems was presented Dr. Kuettner, chairman of the Crew Safety Panel. The study, originally done for P&VE Laboratory for another purpose, covers the flight history of approximately 600 flights of liquid stage vehicles and the occurrence of explosive incidents which were experienced. It was requested that we explore the possibility of extending the study to include the time of malfunction to occurrence of incident and a breakdown of time to events between malfunction and explosion. This effort is underway. ✓
5. S-1C-1 FUEL TANK: Volumetric calibration of the S-1C-1 fuel tank has been completed. Test data and theoretical calculated volume data were compatible within + .15% of the total volume measured. ✓

B5/15

1w/3

1. LVDA/LVDC STATUS: At the meeting in Huntsville last week, IBM presented information on the beneficial and adverse effects of "burning-in" the ULD's. The recommendation by IBM that burn-in be discontinued was accepted on an interim basis. New tests and tighter controls are being instituted in the production of the semi-conductors to compensate for the deletion of burn-in. In addition, ULD's will be burned-in on a sample basis to gather further information on the effects. The matter will be reviewed again after further data is available. ✓

The modified ULD, which has the new design features to overcome the S-clip fracture problem, is now in production at the IBM Components Division. A realistic assessment of the schedule reveals that this new product will not be available to use in Production System No. 1, scheduled for delivery on 7/30/65. Present plans are to allow this system to be built up and delivered with carefully screened ULD's of the previous design. The new ULD would be used first in Production System No. 2, scheduled for delivery on 8/20/65. We have a higher confidence in the reliability of the new ULD design and consequently recommend that Production System No. 2 be designated as the flight system for SA-201. ✓ The present IU 201 checkout schedule indicates that this system could be placed in the IU for final checkout before shipment to the Cape. ✓

2. ELECTROSTATIC PHENOMENA: With reference to the charge buildup problem discussed with you in an Astrionics presentation, the status is as follows: (1) The dynamic electrometer of MSC is not suitable for making charge distribution measurements during propelled flight because of the severe environment. (2) We have worked out a scheme which appears feasible for SA-10. It involves a voltage measurement, rather than a current measurement as you suggested. The impact on SA-10 appears to us to be negligible. We are proceeding to discuss with Lee James how to implement. ✓ (3) The cost in-house will be approximately \$200 in parts and about four months manpower effort, most of which will be required in overtime. ✓

I would like your view on whether we should proceed, if Lee James concurs in the required changes and their impact. Technical details can be discussed with you at your convenience, if desired. ✓

Yes;  
yes please  
B

3. SINGLE SUPPORT CONTRACTOR STAFFING: As of this date, the on-site staffing by the Single Support Contractor has reached 50% of its goal. On 4/30, Sperry was given a waiver to the Center policy of attempting to staff their Single Support Contract through the hiring of incumbents or from the local area since this has not been successful. Sperry is proceeding immediately to relocate critical skills from within their Corporation to the Huntsville area and subsequent assignment to Astrionics. It is anticipated that it will be approximately two weeks before the effect of this change in recruitment policy will be felt in the laboratory. ✓

NOTES 5/3/65 HEIMBURG

B<sub>5/15</sub>

Tw 3/3

1. S-1C

Next firing is scheduled 5/6, for 15 seconds. ✓

2. S-11 BATTLESHIP

An abort by failure of the No. 3 engine "ignition detection" to pick up followed three unsuccessful attempts to fire the S-11 battleship cluster for the first time. Helium supply will determine when another firing attempt will be made. ✓

3. S-IVB - FACILITY CHECKOUT VEHICLE (FCV)

A fully automatic propellant loading was accomplished on Stand Beta 1 on 5/1, with the FCV. No particular problem was encountered. ✓✓

The checkout vehicle will be pulled off the stand 5/3, and be ready to install 201, the first flight vehicle, 5/5. ✓

4. YFNB 45

The YFNB 45, MTO shuttle, was delivered to the Government, 5/3. All other marine construction work is on schedule. ✓



Tw 5/3

NOTES 5-3-65 HOELZER

B 5/15

1. COMPUTATION LANGUAGE FOR TRAJECTORY CALCULATIONS:

An experimental version of a trajectory computer language has been run successfully on the 7094. Computation Laboratory has completed definition of computation modules ahead of schedule. This makes it possible to shorten the contract period from six months to three months. We expect complete implementation of the system well in advance of the original schedule. ✓

2. OUT-OF-HOUSE COMPUTATION CONTROLS: During recent Congressional Hearings NASA, as well as the DOD, was asked to furnish cost figures for computer services on their contracts. NASA Headquarters subsequently asked MSFC for such figures on all our contracts. The ultimate figure required is the total dollar MSFC spends, both in-house and out-of-house, for computer services. This figure could only be furnished with a questionable degree of accuracy. It is expected that future requirements will also make mandatory our having such figures available. ✓ If this is agreeable with you and others concerned, we will work with IO, R&DO, and the staff offices in setting up a system whereby a better figure can be obtained. ✓

OK. with me  
JH

NOTES 5/3/65 JAMES

B-7/15

1w/3

S-IVB: Automatic loading of the facilities stage was conducted Saturday. X  
We plan to remove this stage from the stand early this week in order that  
the 201 flight stage can be installed. X Flight stage was shipped Friday, <sup>30 April</sup> A  
full duration battleship firing is scheduled for May 4, with a full gimbal  
program planned. This firing will complete the battleship firings of the  
Saturn IB Development Program. X ✓

PEGASUS B: Prior to completion of the installation of the command module  
on Thursday, a cloud burst occurred and a considerable amount of water  
entered the payload barrier bag. Initiation of planned tests were delayed  
for a few days to permit the drying of the payload with a dry warm air  
stream. Compatibility checks indicated no apparent damage to the canis-  
ter electronics. It does not appear that this incident will affect the  
scheduled launch date. ✓

RCA 110-A COMPUTER: On April 23 an explosion of a low pressure Freon  
tank at Wyle Laboratories damaged four racks of the acoustic test computer.  
The acoustic test will be delayed about 30 days pending repair of the equip-  
ment. This test computer is scheduled for ultimate delivery to Astrionic's  
Laboratory for experimental work, so there is no program impact. ✓

I.U. CHECKOUT STATION: Cable deliveries from GE, Daytona, are  
directly affecting the checkout station readiness date. We have directed  
GE, Huntsville, to apply the necessary resources and overtime to expedite  
these deliveries. ✓

SA-205 MISSION: In discussions with MSC this week, mission planning  
personnel stated that the MSC 205 Mission Requirements Document is in  
process of being released. MSC wants to definitely plan for an elliptical  
orbit rather than a circular orbit. They have restrained the perigee to  
80 NM but have not stated any particular apogee. Additionally, they would  
like for this to be effective on 204 if possible. We have discussed this with  
R-AERO personnel and they feel that the current payload gain from an  
80/140 NM orbit is in the neighborhood of 800 lbs. ✓

SATURN IB DYNAMIC TEST PROGRAM: SA-207 configuration tests are  
commencing. These tests were scheduled for completion on a tight  
schedule by May 15, however, since KSC has eliminated the requirement  
for Launch Complex 37 facility checkout, we will be able to provide some  
additional dynamic test time. ✓

S-IVB-201: (Late note) Due to rough weather, the barge had to lay-to at  
Point Conception, Calif. (near Vandenburg), from Saturday morning to  
Sunday evening. The barge is underway, proceeding slowly as weather  
abates. ETR SACTO is late Wednesday or early Thursday. This will be  
about two days behind schedule. ✓



1w 9/3

# NOTES 5-3-65 Koelle

1. Space Race Status: As you know, we have attempted to develop a yardstick to measure the progress of space flight. While one can have different opinions about the method used and accuracy obtained, nevertheless, the interim results of our validity tests are interesting and I do not want to keep these only for myself.

The yardstick against which we measured is the weighted space program objectives, developed by a group judgment of some 600 senior professional people. The progress itself is measured by 60 "progress indicators," 34 of which are milestones reached and when they are reached. The other 26 progress indicators are quantitative in nature, such as total number of launches, total equivalent mass orbited, total manhour accumulated in space, etc.

Using this method now to determine the progress of the U. S. space program made as a function of time, we obtained the values below: (To make it more interesting, we have also measured, in the same way, the progress of the USSR against our objectives - while this might not be meaningful, we could not resist the temptation of doing so.)

As of the End of the Year	Percent of U. S. Objectives Reached	
	U. S.	USSR
1957	0.03	( 2.56)
1958	1.37	( 2.61)
1959	2.30	( 3.60)
1960	6.65	( 6.15)
1961	8.43	( 8.44)
1962	14.07	( 9.03)
1963	17.18	( 9.52)
1964	18.13	(12.09)

If we measured just the progress in the manned space flight program, the USSR would be clearly ahead of us. If we eliminated our successes with weather and communication satellites, it would be a draw.

Because we weigh heavily commercial applications (each of these satellites obtain about 3 points each), this fact gives us a clear lead over the USSR at this time. A word of caution is in order, however, because they will have a different list of weighted objectives and one should not conclude from this table that we are ahead of them in world opinion or in their own. With our own scales of measure, however, we seem to do alright. I am well aware that this is nothing more than a numbers game, but I do feel strongly that it would be nice to have a method which does measure the progress we are achieving. It is not easy, however, to add apples and bananas, as we all know.

Tw 5/3

NOTES 5-3-65 KUERS

B 5/15

1. Visit by The Douglas Aircraft Company: Mr. Jesse Jones, Vice President of DAC, Missile and Space Systems Division; Mr. N. H. Shappell, Assistant Director for Operations, and Mr. Frank Duquette, Director of Customer Relations, visited with us to see manufacturing operations and hardware of the S-IC stage. We arranged and accompanied them on a tour through the Michoud Plant last Monday where they got acquainted with Mr. R. Nelson, and Mr. F. L. Coenen for the first time. On Tuesday we toured Test Laboratory and ME Laboratory facilities. ✓

2. LH<sub>2</sub> Project: All of the tooling for the lower frustum has been released for fabrication. Design of tooling, clip-jigs, and drill plates for the upper frustum is well under way with expected completion next week. Nose cone detail part fabrication on both upper and lower frustum is approximately 50% complete. ✓

3. S-IC-501: Positions of Lox and Fuel Containers for 501 in the Tower Building were switched last week. The Lox Container is being prepared for hydrostatic test and the Fuel Container has been joined with the Thrust Structure although systems installation into Thrust Structure is only about 30% complete. ✓

4. Pressure Volume Compensator (PVC) Problems: A team of ME Laboratory personnel and Mr. Coenen of The Boeing Company visited Flexonics last week to review status and problems on ducts for 501 and PVC's for 502. From a manufacturing processing or technical position, Flexonics appears to be in command of the problems. ✓ It is felt that better management control, however, must be applied to improve forecasted delivery delays for 502. ✓ At Arrowhead the outboard Lox PVC's have now passed all qualification tests except the burst test. The welding problem, however, of joining Inconel 718 with Stainless Steel 321 has not been solved for production since the company has not yet succeeded in establishing an acceptable weld schedule. This affects inboard and outboard PVC's for 501, delivery of which is now slipping to the middle of June. ✓

NOTES 5/3/65 MAUS

35/15

1w9/3

1. MANPOWER - NASA Headquarters has issued to the field centers for comment a proposed procedure which will establish a NASA-wide work measurement system, effective July 1, 1965. This procedure applies to property and supply activities only; however, it establishes a precedent, and we can probably expect additional areas to be covered in the future. As written, it requires quarterly reporting of work units (count) and manhours expended for five work areas, including civil service and contractor manhours and regular and overtime hours. ✓

2. LONG RANGE PLANS - BUREAU OF NAVAL WEAPONS - We have received for information and retention a set of the Bureau of Naval Weapons Long Range Plans. These plans cover 83 different technical areas, and are somewhat similar to the Air Force Project Forecast Reports.

We will give you a brief summary, ✓ and otherwise pass the documents on for a detailed review by R&DO.

Please  
do. B

3. PERT SYSTEM REVIEW AND DISCUSSION - The PERT system review and discussion requested by Dr. Rees was held on April 30, 1965, in Saturn V Control Room.

The purpose of the review was to examine informally the project manager's application, utilization and assessment of the PERT system as a "management tool" from the contractor level through MSFC reporting of schedule status to MSF Headquarters.

Dr. Rees plans to publish separately a report of findings. ✓



1w3

B5/15

NOTES 5-3-65 McCARTNEY

1. SINGLE SUPPORT CONTRACT MANAGEMENT SCHOOL:

Representatives of R-RM and the laboratories attended a one-week course of instruction on single support contract management presented by Harbridge House under contract to MSFC. The purpose of this initial course was to critique the course content to assure proper coverage and application to our particular type contracts. As a result of this first week's critique by attendees, Mr. Newby and the Training Branch of Personnel have agreed to modify the course. ✓ With the modifications proposed it is believed that this school will be most beneficial to personnel within the laboratories charged with administration and technical supervision of our single support contract effort. ✓

2. HUMAN RESOURCES STUDY: R-RM continued work on the Human Resources Study in support of Executive Staff and the Human Resources Committee. This exercise involved correlation of the overall laboratory personnel authorizations with the proposed time-phased action plans under the Study and will be reflected in the final submission of the Study by the Human Resources Committee. ✓

3. WORKLOAD AGREEMENTS, IO and R&D Operations: Considerable progress has been made in the past several weeks in finalizing the basic approach for formally receiving work from IO within R&D Operations. To date, the basic agreement and the general approach have been worked out with the IO Staff including representatives from the Program Managers Staff and Stage Offices. In addition, the principles of the new arrangement have been presented to the R&D Council, the Resources Management Chiefs of the laboratories, and to FMO. At this time, there appears to be general agreement by the organizational elements concerned and our target date of finalization of the procedure by June 30 with full implementation by the second quarter of FY-66 looks realistic. ✓



Tw 5/3  
B 5/15  
NOTES 5/3/65 RUDOLPH

1. S-II Battleship Test #006 - The S-II Battleship test #006 conducted on Saturday, May 1, 1965, was scheduled to be a 10 second cluster test. The test was cutoff automatically at ignition due to failure to receive an ignition detection from No. 3 engine. Based on a preliminary evaluation, it appears a failure occurred in the detection probe in the engine. A detailed study is continuing to verify the cause of the cutoff and should be complete on Tuesday, May 4, 1965. A second attempt will be made to fire 10 seconds on Tuesday, May 4, 1965. ✓
2. S-II-S/D Test Program - Three tests have been completed to date in Structural Test Program, the last test being ultimate design load test on the thrust structure. ✓
3. First Boeing MSE Hardware Delivery - The S-IC intertank umbilical control test box was delivered on schedule. This is the first hardware delivery for the new Boeing MSE Contract. ✓
4. Instrument Unit Ground Test Program Status:
  - a. S-IU-200V (Saturn IB Vibration Test Unit) - The second test with excitation in the "Y" axis was conducted April 23, 1965. The instrument unit was subjected to one and one half minutes of random excitation with a bandwidth from 10 cps to 700 cps. Bonding failures occurred to the mounting pads of the Flight Control Computer, Launch Vehicle Digital Computer and Launch Vehicle Data Adapter and Air Bearing Supply. Rebonding of these pads by ME Lab was completed on April 29, 1965. During test on April 30, 1965, bonding failures re-occurred. A decision has been made to use mechanical fasteners on S-IU-200V for critical components in order to minimize program impact. ✓
  - b. S-IU-500V (Saturn V Vibration Test Unit) - Structural fabrication has been completed; component assembly is expected to be completed by May 23, 1965, as scheduled. ✓
  - c. S-IU-500ST (System Test - Saturn V Breadboard Test Unit) - Structural modification is expected to be completed May 9, 1965, as scheduled. ✓
  - d. S-IU-500F (Facilities Checkout Unit) - Component assembly was completed on April 29, 1965, as scheduled. ✓
  - e. S-IU-200S/500S (1st Structural Test Unit) - Testing is expected to start May 17, 1965, approximately 1 month late. With start of testing on May 17, 1965, there would be no program schedule impact. ✓
  - f. S-IU-200S/500S-II (2nd Structural Test Unit) - The structural segments have been shipped from NAA and are expected to arrive at IBM today, May 3, 1965, for assembly. ✓
  - g. S-IU-500FS (Flight System Test Unit) - Currently being assembled. Checkout will be delayed approximately 1 1/2 months because of the lack of ESE which is expected to be delivered on July 7, 1965. No program schedule impact at this time. ✓

A.R.  
The SIVB stage is loaded with bonded-on studs for support of cable harness, small pipes etc. Suggest someone validates this design in view of the I.U. vibration failures of bondings.

B



NOTES-5-3-65-SHEPHERD

B 5/15

7/5/3

Mississippi Test Facility - Bill Lilly is scheduled to present the request for additional funds (8.584 Million) for the S-II Complex at Mississippi Test Facility to Dr. Mueller today and upon his approval to Dr. Seamans tomorrow. It is to be expected that the funds will be available to us by 7 May. All of the requested funds are coming from MSFC projects. Approximately three quarters from the Engine Programs. ✓

A TWX was received from Bill Lilly (29 April) directing that the design contract for the J-2 Environmental Testing Facility (diffuser and altitude simulator) be terminated. ✓ This action was considered necessary in order to provide funds (5.0 million) for Mississippi Test Facility. ✓

Labor at Mississippi Test Facility - The New Orleans construction contractor people have reclama their case of shift work in lieu of overtime at Mississippi Test Facility to Mr. Rieke and Paul Styles (28 April). Mr. Rieke properly has the action. His plan is to gather additional labor statistics regarding the number of construction workers employed on Corps of Engineers construction contracts and the numbers to be employed by MSFC contracts during the activation phase. This data will be presented to Senator Long and the New Orleans people. There appears to be merit to the belief that the New Orleans people are attempting to use the Government to force the international unions to flood the New Orleans area with labor. ✓

Visit of Colonel Sollohub, 29 - 30 April, Office of Construction, NASA Headquarters - Colonel Sollohub reviewed the MSFC (Huntsville) AE Selection procedure, construction contracting procedure including sole source actions and change order controls. In addition he toured all the construction activities in the area. Colonel Sollohub stated he found no major problems. ✓

NOTES 5-3-65 Stuhlinger

B 5/15

fw 3/3

1. PEGASUS A: We began an effort to analyze the directional effect of meteoroids as indicated by Pegasus A data. Due to the slow accumulation of statistical numbers, we do not expect results earlier than in a few months. ✓
2. RESULTS OF PEGASUS A: Dr. Gilruth asked for a preview of Pegasus A results during the past Management Council Meeting. Dr. Johnson and I are planning to give a presentation on Pegasus A at MSC in June. In reply to Dr. Gilruth's request, we will write a brief status report earlier. ✓
3. AES LUNAR SCIENCE SYMPOSIUM: In the words of one of the 250 attendees, this symposium was "the most important event in terms of science and space physics that has happened at the Marshall Center since the days of Explorer I. The participation of Dr. Mueller, Dr. Newell, and Dr. von Braun gave it a tremendous weight and importance." It became very apparent that MSFC would have the capability of taking over the important role of the intermediary between the scientists and the AES Project Office, provided that OMSF and MSFC management so desires. ✓
4. TOTAL FY-65 ART/SRT PROGRAM STATUS:

	<u>Annual Plan</u>	<u>Authorized</u>	<u>Processed to FMO</u>	<u>Obligated</u>
OART	14,080,000	13,722,000	13,037,000	5,534,924
MSF	22,000,000	22,000,000	21,522,078	9,516,911
OSSA	1,412,000	1,412,000	1,407,994	137,106
OTDA	2,000,000	2,000,000	1,766,519	930,585
TOTAL	39,492,000	39,134,000	37,733,591	16,119,526

FY-66 MSF - SUPPORTING DEVELOPMENT PROGRAM STATUS:

<u>Annual Plan</u>	<u>Authorized</u>	<u>Processed to FMO</u>	<u>Obligated</u>
23,700,000	**5,300,000	1,675,000	0

- \*\* This program authority was made available for initiation only of those tasks approved in FY-65, but which cannot be obligated prior to June 30, 1965. The PR's can be processed up the point of signature on the contract, but will be obligated against the FY-66 Program which will be authorized and funded effective July 1, 1965. ✓

May 10, 1965

MADE



MADE

MADE

MADE



RL10 ENGINE A prototype RL10 Injector (designated JX 944) developed a specific impulse of 445.7 seconds (1.7 seconds above the required nominal) on an R&D "A3-3" engine last week. Further testing of this and other configurations is being pursued to arrive at an injector which will consistently produce nominal or greater than required nominal performance. The engine tested did not include the re-contoured throat (metal built up in the throat area to give optimum contour). ✓

S-IVB ULLAGE ENGINES - ROCKETDYNE/GEMINI The fourth engine received for MSFC Qual Program failed the insulation resistance test, between electrical connector pin to valve body, during MSFC acceptance electrical checkout. The failure was limited to the oxidizer valve assembly. The engine will be returned to Rocketdyne for repair and corrective action. A replacement engine was shipped by air freight from Rocketdyne on April 5. ✓

The third MSFC Qual engine has successfully completed two mission duty cycles (1300 seconds total burn-time). ✓

J-2 ENGINE The S-IVB Battleship program on engine J2013 was completed on May 4 with a successful 493 seconds test that included gimbaling in a 7° square pattern. The engine will be removed for shipment to MSFC Test Laboratory. ✓

Production engine J2021 has completed hot fire acceptance testing and is presently in post-test checkout.

The first Flight Rating Test engine, J2022, is presently undergoing hot fire acceptance testing.

An S-II Battleship test was attempted May 5. A fuel turbine over-speed trip cutoff (erroneous signal caused by facility electrical interference - RFI) on engine J2004 caused a test abort at one second. No hardware damage occurred.

A cluster firing was attempted on the S-II Battleship May 5. The test was aborted prior to mainstage due to an induced voltage in facility instrumentation. The source of voltage is not determined at this time.

A cluster firing of the S-II Battleship was successfully completed on May 7. The duration of the test was 10.1 seconds. ✓

F-1 ENGINE Engine 014, wearing a thermal insulation cocoon, was placed in a "Hold Condition" with LOX dropped to the turbopump through LOX lines which were under the cocoon but otherwise uninsulated. After two hours, temperature stabilized at 9-11°F. with outside ambient temperature of 80°F.

Engine F-2004 (the FRT limits test engine which, with only a few minor components replaced, has had 35 starts) ran a scheduled 165 seconds which is the first full duration run meeting the latest Qualification requirements. ✓

Engine F-3015 arrived at MSFC on May 4, and is in Qual for checkout.

S-IC-T five engine cluster firing of 15<sup>+</sup> seconds of mainstage on May 4, with engine #1 gimbaling 2° at 1½ CPS, was successful. ✓

A pre-negotiation conference with eleven (11) representatives of NASA Headquarters (i.e. Vecchiotti, King, Linn, Lemke, et al) will take place today, Monday, in the Director's Conference Room - 4200, at 9:30 A.M. relative to the incentive approach to be used for the conversion of the F-1 R&D contract. Negotiations with the contractor have been slipping since May 3, and will continue to be slipped until we receive Headquarters approval on our contract approach. ✓

GENERAL Dr. Seamans, Mr. Shearer and Mr. Lloyd of NASA Headquarters will be at Rocketdyne Tuesday, May 11, with eleven (11) Aerospace publishers for a general orientation on the activities and status of the programs. ✓

1. S-IV BATTLESHIP TEST SERIES COMPLETED: The final test verified engine gimbal system operation; test duration was approximately 495 seconds. The restart test program for SATURN V configuration will begin in approximately six weeks. ✓
2. AUTOMATIC LOADING OF S-IVB FACILITIES CHECKOUT VEHICLE (FCV) SUCCESSFUL: With the exception of propulsion subsystems, the FCV was checked out and verified in the automatic mode (propulsion checkout program was not ready). Rapid fill LOX and LH<sub>2</sub> flowrates were 1010 and 3100 gallons per minute, respectively; design values are 1000 and 3000 gallons per minute. ✓ Both propellants were simultaneously detanked manually in approximately 1.0 hour. This test concluded FCV testing at the Sacramento Test Center. ✓



B 5/17

1. S-I/IB

Status of S-I-10 - Stage in process of being weighed. Operation # 2000 (preparatory to shipment) still in progress. All hydraulic packages are still removed from the stage, with the first package's return from Cadillac Gage scheduled on May 18, 1965. CCSD is subjecting a modified package (change in piston and O-rings) to 100 hours of operation. This operation is approximately 50% complete. ✓

Status of S-IB-1 - Removing static fire equipment and installing flight hardware. Installing antennae. Working squawks found in Huntsville. Engine # 7 (H-4046) removed for replacement. This is the engine that was found to be leaking after static fire. ✓

Status of S-IB-2 - All inboard engines and three inboard heat exchangers installed. Tubing being installed and incorporation of modifications continuing. The four outboard engines are in post-modification checkout prior to installation. ✓

Status of S-IB-3 - Wrapping and installation of wiring harnesses and installation of tubing continues. Modifications being incorporated. Performing megger checks in instrument compartments. The assembly of this stage is approximately 80% complete. ✓

Status of S-IB-4 - Installing wrap-a-round lines and water quench lines. The spider beam splice plates 60C30123-1 & 2 have been removed and checked for cracks, and are being reinstalled. This action was a result of like items being found cracked on S-IB-1. All other like splice plates in house are being checked. ✓

Status of S-IB-5 - All four fuel tanks have been received and are presently undergoing receiving inspections. ✓

2. S-IC

If The hydrostatic testing of "D" vehicle fuel tank has been completed. This included proof pressure test of 51.7 psig and volumetric calibration determination. The fuel tank has been moved to the horizontal assembly area, and "D" lox tank has been placed in the test facility for hydrostatic testing. ✓

B 5/17

1. Saturn V Systems Engineering & Integration Support Requirements - Working agreements for data acquisition by Boeing have been arranged by representatives of IO, R&DO, and Boeing during visits to DAC, S&ID, and RCA. The contractors will supply data to Boeing, provided MSFC will fund for the additional workload. Tentative schedule for final coordination of the working agreements is 5-14-65 and for final implementation 6-14-65. ✓

2. S-II Thrust Structure Test - A structural test of the S-II thrust structure at most adverse simulated conditions (max gimbal angle of 10 degrees and one engine out) failed at 1.2 max load. Although investigation is going on, no redesign is contemplated. ✓

3. S-II Design Reviews - Four new design data packages arrived this week. Camera System, Propellant Dispersion System, Pressurization System, and Dual Plane Separation System. In-house design reviews are being scheduled for June, 1965. ✓

4. Configuration Management - Proposed agreement regarding Configuration Management was discussed between KSC and MSFC. Both Centers will review the entire agreement once more prior to its presentation. ✓

5. ICD Operations - General Phillips was assured that SA-201 hardware ICD's would be completed before the July PRB meeting. Colonel James advised Colonel Petrone that the Saturn IB CCB at MSFC would coordinate ICD changes with KSC as appropriate prior to implementation.

An ICD Matrix will be used to insure that all major interfaces for SA-201 are being covered by the Panels in total. ✓

6. AES Experiment Integration - Work statements were received from the Instrument Unit contractor on developing integration concepts for seven AES experiments which appear as likely to be integrated into the IU area. These experiments were selected on the basis of the review of the AES package which was made at the request of NASA Headquarters, (Taylor). ✓

7. Panel Review Board - Met on 5-4-65 under Phillips' chairmanship. An internal MSFC report will be provided to you separately. ✓

K.D.  
They told  
me at S&ID  
a minor  
local  
beef-up  
is  
intended!  
B



1. Housing situation - is adequate now but will soon be critical. We have alerted local builders, the State Director of FHA, and two large Building and Loan firms, one from Jackson, the other from New Orleans. A good step would be to increase the number of speculative commitments allowed each builder by the FHA from the present three to ten, if at all possible. This would be preferable to bringing in an outside firm and building a large development at one location. ✓
2. Visitors - Air Reduction brought over a sizeable group of executives, led by their Vice President, Bob Wood. Chancellor Williams and three top personnel from the University of Mississippi called Friday to discuss graduate education. ✓
3. The Gulfport Cleaning Facility - has been certified, and is going into production. This is the ConAm facility provided, by sub-contract to GE, for cleaning valves, components, etc. prior to installation at MTF. ✓
4. Opening meeting for the FY-66 negotiations with GE/MTSO - was held May 5. The work statement has been negotiated. ✓
5. New total projected manpower figures - for MTF were released to the press this week. ✓
6. Four Air Force QC Personnel - reported to MTF this week. A total of 40 - 50 are expected to be on board by June 1. ✓
7. S&ID continues to have a problem at MTF with the facsimile and TWK - system that they requested from the S-II Stage Manager's Office, MSFC. The basic problem is government-furnished specialized, company-peculiar communications facilities that are incompatible with existing government equipment and requested in excess of similar centralized services now available at MTF. The problem cannot be solved at MTF. It is recommended that it be resolved between the IO Director's Office and MSFC Management Services and that all concerned be informed of the action taken.
8. The review of the S-IC-T/B-2 activation requirements revealed - approximately 23 weeks of negative slack after interfacing with brick and mortar and Technical Systems activities.

I.O.

Sounds like a rather extravagant demand.  
Please look into real need.

B



CONFIDENTIAL

File 9/0

B5/17

NOTES 5/10/65 GEISSLER

1. (C) Saturn IB Current Performance: Current performance capability for each Saturn IB vehicle, based on May weight status is as follows: SA-201: 28,090 fps reentry velocity; SA-202: 29,230 fps reentry velocity; SA-203: 21,090 lbs liquid hydrogen; SA-204: 34,640 lbs payload; SA-205: 36,720 lbs payload; SA-206 & Subs: 36,810 lbs payload. (SA-206 payload does not reflect possible "LEM ALONE" mission.) ✓

2. (C) Saturn V Current Performance: Current performance capability for Saturn V vehicles, based on May weight status is as follows: SA-501: 85,815 lbs; SA-502: 86,165 lbs; SA-503: 86,461 lbs; SA-504: 96,700 lbs; SA-505: 96,861 lbs; and SA-506: 99,327 lbs. ✓

3. SA-8 Lifetime: The current SA-8 orbit yields a mean apogee of 745.5 km and a mean perigee of 511.9 km. The nominal lifetime for SA-8 based on this trajectory is 1200 days. A guaranteed lifetime will be available later this week. ✓

4. Plans for Spectacular Missions for Saturn IB and V: In our search to identify spectacular missions for Apollo, the following listed items are being studied: (1) Near rendezvous with a suitable existing satellite (U.S. or foreign) for visual inspection. ✓ (2) Early lunar circumnavigation with Apollo. ✓ (3) Early hard landing on the Moon with LEM only. (4) Polar Orbit (Manned) IB. ✓ (5) Capture of earth satellite. ✓ (6) Pegasus type package into a Mars fly-by orbit or deep space trajectory to learn about deep space meteoroid conditions. (7) Tossing out of hatch a small satellite package, e.g., radiation or ionosphere experiments. (8) Artificial gravity experiment by rotating capsule with tether-weight system using attitude control system for angular acceleration. ✓ (9) Hard landing on moon with explosive warhead or chemical dye to be observed by earth-based telescope. (10) Launch on time within a narrow launch window. ✓

Hardly →

Hardly

Hardly

E.F. ✓  
Preferably  
Explorer I  
B  
(Bring it home)

Not spectacular. No

5. Presentation on "Extreme Value Statistics" In response to your comment on above subject in Notes 4/26/65 Geissler (copy attached): A stochastic process is an ordered set of observations in one or more dimensions, each observation being considered as a sample of one item from a probability distribution. If the probability distribution remains unchanged from one observation to another, the process is said to be stationary. ✓

CONFIDENTIAL



B 5/17

1. S-IV PROGRAM: The S-IV 10 stage is presently being prepared for shipment from storage at Sacramento to KSC. This is considerably in advance of previously scheduled shipment and launch preparation. ✓
2. S-IVB PROGRAM: The S-IVB Battleship stage is presently undergoing a series of static firing tests in the Beta I test stand at SACTO. During a full duration test (8 minutes, 13 seconds approximately) on May 4 the engine was successfully gimbaled. A first look indicates that no significant trouble was encountered during this test. The S-IVB 201 stage arrived at Sacramento, May 5, approximately 5 days behind schedule. It is undergoing receiving inspection and will then be installed in the Beta III test stand. The work package to be accomplished at Sacramento on the 201 stage consists of 146 Assembly Outlines and 168 shortages, approximately 3500 hours of effort. ✓
3. DAC SUPPORT TO KSC: This Laboratory has completed review of the proposed DAC support contract to KSC. The proposal conflicts considerably with established KSC/MSFC decisions regarding low bay testing of stages at KSC. DAC proposed many system tests which KSC and MSFC had mutually agreed to eliminate. Our comments on the proposal will restate the KSC/MSFC position and recommend a significant reduction in manpower proposed by DAC. ✓
4. COUNCIL OF DEFENSE AND SPACE INDUSTRIES ASSOCIATION (CODSIA) GROUP MEETING: A member of this Laboratory attended the first meeting of the CODSIA Group which is reviewing NASA Quality Assurance program requirements. The meeting was held at Manned Spacecraft Center, Houston, Texas, and was conducted on a constructive note. It is felt that this review can be of benefit to NASA and industry, if continued on that note. The CODSIA Group will visit MSFC on May 11-12, 1965. Concerned MSFC personnel have been notified of the meeting and requested to participate as appropriate. ✓
5. S&ID GSE DESIGN REVIEW: A GSE Design Review was held at Downey, California, April 27, 28 and 29, using systems schematics for Station VIII. The leak-check systems portion of the review was postponed until June in that MSFC has not received most of the drawings in that area. The design review was very satisfactory to both parties, and a good information transfer between the two parties was achieved. Comments were classified as mandatory, recommended to be investigated, and drawing errors. S&ID concurred in all but three classified as mandatory; these three will be investigated further by S&ID and MSFC. ✓



B5/17

1. LVDC/LVDA CURRENT STATUS AND PROBLEM AREAS:

Temperature Cycle Problem: Recent tests revealed that when the multilayer interconnection "pages" on which the ULD's are mounted are subjected to extreme temperature excursions ( $-10^{\circ}\text{C}$  to  $100^{\circ}\text{C}$ ), the resulting stresses cause fractures of the S-clip to ULD connection. These tests were conducted with pages populated with the old ULD design. The new design strengthens this connection, and the goal is to have a stress safety factor of at least two. ✓

Unit Logic Device Redesign: The new ULD design utilizes a modified "S-clip" to minimize the susceptibility to connection fracture, and the addition of a "C-clip" adjacent to the S-clip to insure electrical continuity between top and bottom of the ULD even if an S-clip fracture exists. In addition, a new conducting paste is used and modified processing and controls have been incorporated. The new devices are now in production at IBM-Poughkeepsie and the first delivery of these new units to IBM-Owego is scheduled for 6/4/65. ✓

SA-201 Equipment Availability:

	<u>Shipment to</u> <u>MSFC</u>	<u>Available for</u> <u>IU Checkout</u>	<u>Allocation</u>
Simplex System	6/9	6/22	IU Checkout (if needed)
Prototype System	7/9	7/16	IU Checkout
Production System No. 1	7/30	8/15	Flight (Fall-back Position)
Production System No. 2	8/20	8/25	Flight

Neither the simplex nor the prototype redundant system can be considered flight quality since these systems contain ULD's which exhibit the S-clip fracture susceptibility. The first system made up of the new ULD design will be Production System No. 2. On an emergency basis, Production System No. 1 can be considered as the SA-201 flight system. Although this system contains the unmodified ULD design, the ULD's have been carefully screened and the pages will not be subjected to temperature excursions beyond those expected in test and flight. ✓

1. S-1C:

*If*  
*K.H.*  
*What amplitudes?*  
*B* Test S-1C-05 was conducted on 5/6, for 15.5 seconds. The test was terminated by the static firing sequencer. The fuel tank pressurizing switch was lowered 2 p.s.i.g. for this test to further investigate the 30-cycle oscillations experienced in previous tests. Fuel pump inlet and outlet oscillations were evident in all engines with no apparent harmful vibrations being excited in the stage hardware.

2. S-IVB (MSFC):

The LH<sub>2</sub> storage tanks and burn pond were checked out on 5/4, with liquid and gaseous hydrogen, respectively. ✓

3. S-11 BATTLESHIP:

A successful 10-second duration cluster run was accomplished on 5/7. No major problems were encountered. ✓

4. S-IVB:

The facilities vehicle was removed from the test stand Beta III, and the first flight vehicle (201) was installed. ✓

5. West Coast Barge Orion

During a recent voyage, violent weather, requiring the vessel to seek shelter, was experienced for 48 hours. In bringing the vessel about to run for the lee of the land, the vessel was in a trough with seas to 12 feet. The Captain reported that the vessel hardly rolled. Our stabilizers, recently installed aboard, performed better than we could ever hope for. ✓



SATURN V GSE

In the past few weeks, we have negotiated and signed an amendment to the Random Motion Simulator contract with the American Machine & Foundry Company.

As you know, the original ceiling price contract was \$1.28 million and AMF had asked \$2.84 million to complete the job, and would absorb \$200,000 and 40% of anything above \$2.84 million.

Although we did not like the overrun, a contract amendment was negotiated, after much discussion, for \$2.75 million plus \$40,000 fee. AMF will absorb \$400,000 and 50% of anything above \$2.75 million ✓

Even though MSFC signed the amendment, the situation is not rosy. AMF has changed their management at York, Pa., drastically in the past weeks, and the resulting reorganization and lay-offs have not helped our project one bit. We are keeping at least one man at their plant constantly now, and will continue this practice until the job is complete.

We are still hopeful of meeting the required schedule.

Harry Gorman

Please look into this again and advise whether a suitable letter to the president of AMF would be an order. Maybe by telling him that he's on the critical path to the moon, we can get his personal attention.

B



B5/17

NOTES 5-10-65 HOELZER

TRANSFER OF THE COMPLETE PERT SYSTEM DATA MANAGEMENT SERVICE AND SUPPORT RESPONSIBILITY:

The Computation Laboratory is taking responsibility for the complete PERT System Data Management Service and Support. In the past, this responsibility was shared with the Computation Laboratory being responsible for the computation requirements and the maintenance of the necessary software and hardware to fulfill these requirements; and the Executive Staff having the responsibility of the data management functions (i. e., input/output control, user coordination, etc.) Along with this responsibility, two personnel of the Executive Staff are being transferred to the Computation Laboratory, and the personnel ceilings of the Executive Staff and the Computation Laboratory are to be adjusted accordingly. ✓

The Management Systems Engineering Office of the Executive Staff will continue to be the sponsor of PERT and offer overall policy direction on the project. ✓

B 5/17

NASA AWARDS: You will recall that we have had a position from George Mueller, yourself, and others to reward certain deserving people, particularly as programs come to an end (such as our Saturn I and Pegasus). One interesting problem that we have run into in trying to include the secretarial level, where appropriate, in such awards is the following: We recommended a particular secretary for a Sustained Superior Performance Award and the papers were returned from the Board with the notation that, per a Center memo dated 9 February 1965, subject: Incentive Award Program, secretaries could not be included unless cost savings or cost avoidance was a major part of their performance. Although desirable, such requirements are not particularly applicable for secretarial work.

S-IVB: The Saturn IB battleship hot firing was concluded on Tuesday with a successful hot gimballed full duration firing. ✓ This engine was gimballed to full amplitude of 7° during the firing. The S-IVB 201 flight stage arrived at SACTO and was installed in the stand on Friday, May 7 at 7:00 AM PDT. I leave for SACTO today and will spend about ten days there. ✓

PEGASUS B: Additional tests are being conducted to gain more confidence that no serious after effects resulted from the water damage experienced last week. ✓ The only apparent permanent damage was to the shaft encoder which measures deployment. We plan to disengage the encoder and rely on the on-board T.V. and full deployment micro-switches to give us information relative to deployment. ✓

I. U. DRAWING RELEASES: P&VE procedure of releasing of new top assembly drawings for each I. U. is causing us serious problems at IBM. IBM has identified over 100 changes between the 201 advance releases and the 201 official releases. None of these changes is identified by E.O.'s. The drawing for 202 has also been advance released without any E.O.'s defining the differences between it and 201. This appears to be one of the prime reasons for IBM's schedule delays in their manufacturing and assembly area. We are continuing to pursue this matter with R&DO but no positive resolution has been accomplished. ✓

I. U. VIBRATION TESTING: Vibration testing of the I. U. at Wyle Laboratories is continuing to be plagued by mounting pad failures. These pads are bonded to the structure. This late in the schedule, we consider this to be quite critical. Mr. Kroeger has been advised and is working with P&VE on this problem. Immediate resolution is required if we are to maintain 201 schedules at IBM. ✓

Hasty S.  
but a  
misapplication  
of a fine  
directive?  
B

III for



1. Measuring the progress of space flight: Last week I submitted some figures, showing the relative standing of U. S. and U.S.S.R. space accomplishments, when measured against our list of weighted objectives. For the purpose of clarity, let me break down the total points each competitor receives in our point system. This breakdown is valid as of 12/31/64.

The table below contains yields resulting from traffic volume and milestones reached. The time when these milestones are reached weighs heavily in this judgment. You cash in if you are early and the first.

YIELD PARAMETER USED	WORTH POINTS	
	U. S.	U.S.S.R.
Total space program expenditure	0.25	0.07
Number of unmanned launches	3.31	1.68
Number of Manned launches	0.02	0.03
Number of successful Earth satellites	1.47	0.77
Number of successful lunar probes	0.12	0.10
Number of successful planetary probes	0.03	0.02
1st unmanned satellite (milestone)	0.89	2.43
1st meteorological satellite	3.61	1.33
1st low altitude TV satellite	3.61	0
1st synchronous TV satellite	2.41	0
1st manned satellite	0.79	2.02
1st escape probe	0.39	0.39
1st lunar impact probe	0.20	0.42
1st lunar TV transmission	0.27	0.41
1st unmanned planetary probe	0.81	0.81
1st multiple crew satellite	0	1.61
	18.13	12.09

Do not forget that we are still experimenting with program worth analysis; therefore, do not take these figures too seriously.

HNK I'm sure the Russians could juggle their "worth" system until they came out on top!  
B



B5/17

1. Visit to Grumman Aircraft Engineering Corporation: In connection with the manufacturing engineering support provided by us to MSC, I visited last week the Grumman Corporation, touring most of their shops and the advanced manufacturing development facilities and meeting key people of the manufacturing organization. It was very interesting to notice that the Grumman Corporation is not projectized in the sense as our stage prime contractors are, i.e. there is not a separate Division with separate planning, tool engineering, fabrication, facilities and management for the LEM Program, but all these functions are carried out by the basic line organization where at the same time airplanes are in development and production. With this setup, the very best people and talents at all levels are contributing to the LEM development. Additional control or guidance for the program is provided by a staff organization under the Vice President and LEM Program Director, J. G. Gavin. This is called "LEM Project Coordination Thru Key Personnel" but has no direct authority over the line organization. It would be interesting to compare overall results of this development with other programs with respect to efficiency, successes, cost and schedule controls.

*MSF is very unhappy with rate of progress on LEM! I don't know the reason, but I do know this to be fact!*  
*W.K.*  
 2. S-IC-501 Progress: The assembly of the Fuel Tank and Thrust Structure, including Lox Suction Line installation into Tunnels and painting, has been completed (in the tower building) two weeks ahead of Plan VII Recovery Schedule. ✓

The Forward Skirt and Intertank Section for 501 have arrived from Michoud and are presently being modified by a Boeing crew to incorporate latest changes which occurred during shipping time. ✓

Four of the F-1 engines for 501 have been delivered from Rocketdyne and modification and build-up of these engines has now started. Two engines require recalibration firings by Test Laboratory because modified injector plates for the gas generator had been installed. ✓

570 line items of components (excluding standard hardware) are still undelivered from Boeing for 501. ✓

I fu

B 5/17

1. DOD CONTRACT ADMINISTRATION SERVICES SUPPORT - General Bogart, Director, MSF Management Operations, has issued to the MSF Centers an interim procedure for coordination of contract administration services support from DOD. MSFC has been requested to establish a focal point. ✓

Clyde Bothmer and representatives from the Defense Supply Agency Headquarters are scheduled to visit MSFC May 13. Their purpose is to discuss the operations of the Defense Supply Agency contract administration services and the interface with the NASA regional liaison officials, and Bothmer will explain the functions of his Office of Industry Affairs (Pentagon). Bob Sparks is coordinating necessary arrangements. ✓

2. MSFC PROGRAM OPERATING PLAN (POP) 65-2 - MSFC POP 65-2, including Administration Operations, Construction of Facilities, and Research and Development Operations, has been forwarded to MSF. This submission was reviewed with Dr. Rees and Mr. Gorman last week, and we feel that the obligation and cost planning is the most realistic that MSFC has submitted to date. Total MSFC budgetary requirement for FY 67 is approximately \$250 million above the FY 66 level. ✓

MSF reviews of POP 65-2 are scheduled to be held at MSFC, as follows:

May 12-13	R&D	Col Seccomb & 8 others
May 12	Saturn IB/Centaur Portion	Col Russell
May 17-18	AO	Mr. Heater ✓

3. BOEING S-IC COST AND MANPOWER REVIEW - The S-IC Review is experiencing staffing problems due to the Review Team members having to devote time to other priority actions, such as: SA-501, Incentive Contracting, MTO, and POP 65-2. Chris Andressen is being detailed to the MTO Task Force, and the S-IC Review is being turned over to Lt. Col. John McCombs who has been Assistant Team Director up to this time. ✓

June 1 remains the target date for completion of the review. ✓

4. HUMAN RESOURCES SURVEY - Bill Rutledge is delivering the MSFC Human Resources Study Report (approximately 1450 pages) to MSF and Office of Programs, today. ✓



B 5/17

STATUS OF R&D FY-65 FUNDS:

a. As of May 7, 1965, program balances for R&D Operations are as follows:

Saturn I	\$ 978,128
Saturn IB	1,365,828
Saturn V	1,935
SR&T	3,297,000
Advanced Studies	1,760,000

b. It is planned to return \$800,000 of the Saturn I balance to Industrial Operations.

c. We plan to hold the Saturn IB balance mainly for use in support of Saturn IB/Centaur effort which was not separately funded for FY-65. ✓

d. We have Saturn V requirements on hand in the amount of \$1,339,927; possible deobligations on expiring mission support contracts will amount to about \$426,000. This appears to be the last source of funds available to us, leaving an R&D Operations deficit of approximately \$912,000. These requirements will be deferred until 1966 funds are available. ✓

e. The SS&A Program of \$1,413,000 is totally initiated except for about \$4,000 for obligational adjustment. ✓

f. The T&DA Program of \$2,000,000 has an uninitiated balance of \$233,000 for two studies with Auburn University. The procurement requests are in process in the Astrionics Laboratory, but it is expected that \$80,000 will not be obligated before June 30. ✓

g. The ART Program of \$14,769,000 has an uninitiated balance of \$320,000. \$100,000 is subwork to IO for an H-1 Engine contract. We expect commitment within about two weeks. The balance is for small actions and adjustments. ✓

h. The MSF Supporting Research Technology Program of \$25,100,000 has an uninitiated balance of \$4,500,000. \$2,000,000 is planned to go to IO for a J-1 Engine contract and is to be committed in about two weeks. \$500,000 for a Beryllium study is awaiting decision. Most of the balance is for AES actions due in by May 15. ✓



B 5/17

NOTES 5/10/65 RUDOLPH

1. S-IC-1 Status - The Thrust Structure and Fuel Tank were joined two weeks ahead of schedule. The LOX tank hydrostatic testing is scheduled to begin May 17, 1965, one week ahead of schedule. ✓
2. S-IC-D Status - The Thrust Structure component installation continues on schedule, Fuel Tank hydrostatic testing has been completed and the LOX Tank is ready for hydrostatic testing. ✓
3. S-II-S/D Test Program Status - During the last test of the S-II-S/D thrust structure at 117% load the vertical longeron over #3 engine and the engine gimbal block mount failed. The test called for ultimate load (140% design) condition. S&ID has not yet determined the cause of failure. Analysis is being conducted to determine effect on thrust structure design and every effort will be made to conduct any necessary retests during tower modification period to avoid delay in shipment of S-II-S/D to MSFC. ✓

I fw

4. S-II Battleship Stage Status:

First 10-second cluster firing attempted on May 1, 1965. There was cutoff in ignition due to a faulty ignition detection probe.

On May 5, 1965, a second 10-second firing attempt was aborted at 1.22 seconds after a successful ignition. Premature cutoff was due to an overspeed indication from LH<sub>2</sub> pump #1 engine. The cause of overspeed indication has not yet been determined.

A 10-second firing was conducted successfully at 3:41 pm, on Friday, May 7, 1965. Everything looked good. ✓

- II fw
5. S-II Common Bulkhead Test Tank (CBTT) Status - Due primarily to the requirement for weld repairs and the late delivery of insulation, delivery of the CBTT to Santa Susana is not expected until June 3, 1965, (four weeks late). Testing is expected to start on June 30, 1965, (four weeks late), however, behind schedule condition is expected to be recovered during the test program. ✓

6. S-IVB/V Battleship Testing - The Saturn IB Battleship hot firing program was concluded on May 4, 1965. The Saturn V configuration J-2 Engine (J-2020) arrived at Sacramento on May 1, 1965. Conversion of the Battleship Stage to Saturn V configuration will commence approximately May 14, 1965 and this first Saturn V firing is scheduled for June 18, 1965. ✓

Mississippi Test Facility - On May 6 Bill Lilly presented to Dr. Seamans the status of Mississippi Test Facility including a requirement for \$8.584 million necessary to accelerate the S-II Complex. Mr. Lilly's major points were: 1. That a major complex was being developed at Mississippi; 2. That a great deal of progress had been made in the construction and activation of the majority of facilities; and, 3. That there are four projects pacing the S-II testing which require approximately \$8.584 million to accelerate to meet the S-II test schedule. Dr. Seamans asked Mr. Lilly what was the cause of this. Dr. Mueller answered the question for Mr. Lilly and stated "Mismanagement". Mr. Lilly stated that it appeared that Dr. Mueller had briefed Dr. Seamans on the latest Marshall plans for management changes at Mississippi Test Facility. Dr. Seamans approved the reprogramming request to provide the additional C of F funds. ✓



1. PEGASUS A: In response to Dr. Gilruth's request, we gave him a brief status report on meteoroid hit data to our best present judgement. A Working Paper for broader distribution is in preparation. ✓
2. IRRADIATION EFFECTS ON METEOROID SENSOR DIELECTRIC:  
As part of our effort to study irradiation effects on meteoroid sensors, we are planning to irradiate full-size Pegasus detectors with a "distributed beta ray source" at the Lockheed-operated Dawsonville facility, where NASA still owns equipment and instrumentation. ✓
3. RPL SUPPORT CONTRACTOR: RPL'S contract with Brown Engineering Corporation was signed May 3. Brown personnel will begin work at RPL May 10. ✓
4. SAT IB/CENTAUR BROADCASTING SATELLITES: Considerable interest in satellites for voice and TV broadcasting, to be launched by SAT IB/Centaur, is developing at OSSA, and with Dr. Seamans. We will include consideration of these projects in Dr. Koelle's Advanced Projects Study which is to determine the desirability of MSFC'S involvement in new projects.
5. AES PROGRAM: Our proposed FY '66 program for Lunar Surface Exploration Scientific Support Functions, which has been going through extensive review and rewrite procedures with members of OMSF and OSSA during past weeks, seems to be now in a stage which is acceptable to Headquarters representatives. Our FY '65 program funds (\$2.17M) are presently being obligated by Purchasing. ✓

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May 17, 1965



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NOTES 5-17-65 BALCH

1. Additional C of F Funds for S-II at MTF - On May 13, Dr. Seamans approved reprogramming of 8.584 million dollars from other MSFC projects to MTF. ✓

2. Contracts for Engineering Services, Repairs and Alterations - Upon instruction from Washington, we are instructing GE to subcontract for R&A. In view of this decision, we have also determined that we will likewise have GE provide for an engineering services subcontract, but not to include Title II work (field engineering and inspection). ✓

3. Possible Deferral of Negotiations for FY-66 MTSO Contract with GE - It is beginning to appear that it may well be advisable that we re-examine the work scope of that part of the GE effort that is in the area of participation in the activation of MTF. The work statements applicable to support of operations (transportation, security, custodial and refuse services, etc.) which amounts to about 70% of the forthcoming GE work are satisfactory and negotiations in this area will not be deferred.

4. Inquiry from Congressman Williams, Democrat from Mississippi - Congressman Williams called May 13 regarding complaints of Jackson, Mississippi, contractors, who had reported that as a result of the increase in work hours at MTF, Jackson workmen were exhibiting weekly pay checks of \$400 or more. This compared with pay checks of \$125 to \$150 made previously in a week in the Jackson area. This was having the effect of drawing off labor force of the Jackson area. The larger pay checks at MTF, of course, are resulting from the overtime hours worked each day, six to seven days a week. ✓

5. Function of the Former MTF Working Group - At a meeting held at MTF on May 14, Col. O'Connor and Mr. Heimborg participating, decisions were reached transferring the functions of the former MTF Working Group to MTF. ✓

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RL10 ENGINE RL10 Engines are being assigned to meet Saturn IB/Centaur program requirements as follows:

Two mockup RL10A3-1 engines, originally provided for Centaur production program purposes, are available for installation on a Centaur vehicle mockup requested by MSFC. ✓

Two RL10A-3 engines, used and no longer required for Centaur ground testing on the GD/C Sycamore test stand, are available for the T-1 (Tanking, Dynamics, and Wet Test) vehicle requested by MSFC. ✓

S-IVB ULLAGE ENGINES - ROCKETDYNE/GEMINI The preliminary checkout of equipment and vibration fixture for use in the MSFC Qual program was started May 10.

A replacement engine for the fourth MSFC Qual engine has been received. To date, a total of eleven engines have been delivered by Rocketdyne.

The third MSFC Qual engine has successfully completed three mission duty cycles (1950 seconds total burn-time). ✓

H-1 ENGINE A thrust chamber tube split during the duration test of S-IB-1 prompted a detailed investigation of the temperature profile of the thrust chamber combustion zone. An R&D engine was instrumented with thermocouples at various locations in the combustion zone and tested six times. Preliminary analysis of the data has not revealed any reason for the localized overheating which accompanies a split of this nature. Investigations are continuing with primary emphasis on the effects of various LOX system purge pressures. ✓

J-2 ENGINE The first Flight Rating Test engine, J2022, is presently undergoing hot fire acceptance testing.

R&D Engine J2016-1 demonstrated minimum S-II Stage LOX recirculation bleed flow rates satisfactorily.

Negotiations to convert the J-2 Engine Production Contract, NAS8-5603, to a Cost-Plus-Incentive-Fee are presently being conducted.

II F-1 ENGINE Test stand 1-E operational checkout damage was minor, consisting of some paint removal, loss of some sheet metal weather and heat shield panels, and flattening of a section of security fence about 1,000 feet downstream of the flame deflector. It is now being prepared to begin environmental chamber checkout using engine F-2004 and starting with partial capability of the environmental extremes. ✓

GENERAL On Wednesday, May 12, the presentation on the F-1 pre-negotiation position relative to conversion of the Development contract to an incentive package was given to Dr. Mueller in Washington. He bought our position and felt we had a good package.

The J-2 pre-negotiation package for production was approved by TWX Thursday, May 13. Some limitations were added; however, we feel we can manage to work within them.

Informal conversations with Air Force personnel indicate that the Air Force will reconsider divesting itself of AF Plants 56 and 57 (Canoga Park and Santa Susana respectively) per Dr. Seaman's letter of May 5, 1965, to Assistant Secretary of Air Force, Bob Charles. Special Board set up by NASA Headquarters to establish NASA position on these plants will recommend that Mr. Webb clarify with Mr. McNamara extent of DOD field support of NASA. Clarification will be sought in comparing the space act and NASA DOD agreements based on the space act with McNamara's "plant divestment policy." ✓



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NOTES 5-17-65 CLINE

1. S-II BATTLESHIP MAINSTAGE CLUSTER FIRING SUCCESSFUL ON SECOND ATTEMPT:  
Mainstage (90% full thrust to cutoff) duration was 10.1 seconds. No major problems were encountered. Preconditioning of engines was effected by LOX overboard bleed and LH<sub>2</sub> recirculation. The next series of tests will be a cryogenic program followed by a 20-second mainstage firing in approximately three weeks.

NOTES 5/17/65 CONSTAN

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Negative Report



NOTES 5-17-65 DANNENBERG

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1. Saturn V MGSE Scope of Work - The scope of work for conversion of the Saturn V Mechanical GSE work to full mission basis was delivered to IO 5-14-65. Boeing will be asked to submit a proposal by 6-10-65. Evaluation of the proposal and negotiation will proceed on a schedule that will allow incursion of cost from 7-1-65. ✓
2. F-1 Engine - Thermal Insulation - From an action item of the past S-IC Quarterly review, P&VE is re-evaluating the requirements for thermal insulation around the cocoon area of the F-1 engine. A presentation on this item to Mr. Rees is being prepared. ✓
3. Data Management - Upon request of the System Checkout Working Group, representatives from S-IVB Stage Manager's Office, R-QUAL, and R-SA discussed documentation necessary to accompany a stage to each site. It was agreed that DRLs (Document Requirements Lists) and DRDs (Document Requirements Descriptions) would be prepared where applicable to all stages of the Saturn IB and V programs. It appears that documentation being supplied by DAC presently is sufficient to meet the working group's requirement. ✓
4. ICD Operations - A series of Panel ICD Reviews between MSC and MSFC were conducted during the week to define the problems and milestones for their resolution. Also, the SA-207 ICD matrix was updated in these reviews. Similar reviews will be conducted with KSC in the near future. ✓
5. Configuration Management- Briefings will be given by R-SA to R-ME on 5-17-65 and to R-QUAL on 5-20-65. ✓

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E.G.  
It is of considerable importance "politically" to establish and demonstrate the Sat IB's polar capability from KSC. Titan II C uses its "one" polar capability from Vandenberg as great selling point.  
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1. AES-Earth Orbital Meeting at MSC: In a discussion with MSC, May 13, 1965, on the use of the Saturn IB for polar orbits in the AES Earth Orbital Program, it was decided that MSC will establish in the next few days a mission objective for an AES Saturn IB polar orbit flight. Based upon this objective, MSFC will prepare a flight profile, and will negotiate with range safety (Col. Baxter) and KSC (Dr. Knothe) to establish a flight path which will provide a maximum CSM mounted payload into a polar orbit. ✓ This meeting with Dr. Knothe and Col. Baxter has been preceded by an earlier meeting between Dr. Knothe and representatives from our laboratory, in which it was agreed by KSC and MSFC that there is a reasonable flight path utilizing a southern launch that can accomplish the objectives of this mission. ✓

2. Flight Operations Panel: The meeting was held 5/12 and 5/13 at KSC. The main point of discussion was to receive MSC's proposed criteria for utilizing the S/C abort command on mission 201. The following four criteria were agreed upon: (1) Total loss of S-IB thrust; (2) failure of S-IB/S-IVB separation; (3) total loss of S-IVB thrust; (4) loss of attitude control after S-IVB cutoff. Two additional cases were not yet accepted but MSFC will investigate: (1) partial loss of S-IB thrust; (2) loss of attitude control during S-IVB burn. MSC quoted the following abort criteria for excessive trajectory deviations: (1) Sufficient time for recovery sequence during early power flight; (2) 20 g maximum re-entry load; (3) sufficient time of free fall to 400 kft; (4) 5,100 to 5,400 nm impact range limitation; (5) 400 nm cross range deviation. These criteria will be modified to assure obtaining launch vehicle objectives. MSC is planning to submit a first set of flight mechanical limit lines by July 1. ✓

3. Engine Up-rating Analyses: Recent changes in H-1 and J-2 thrust levels have had a significant impact on our workload. H-1 thrust is now 205 + 1K with SA-206 effectivity. On 5/11/65, Saturn Program Offices and Engine Mgt Office decided that J-2 thrust will be 200K throughout IB program, with 205K effective on SA-504. Previously, analyses were based on J-2 thrust of 200K for SA-201 - 203, 205K for SA-204 and subsequent IB's, and 205K for all Saturn V's. These changes will impact our IB workload in the following areas: (a) design trajectories for SA-204 - 206; (b) elliptical orbit and lifting trajectory studies; (c) interface documentation requirements; (d) control studies; and (e) alternate mission analyses.

Lee Belew

This shows we must be careful with changing your thrust figures too often! This refiguring may be costlier than your program effects!  
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B 5/20

1-2/1

1. PARTS RELIABILITY INFORMATION CENTER (PRINCE): Since assuming the PRINCE effort from Astrionics Laboratory on April 1, 1965, we have been making a concerted analysis of the program. PRINCE in its original form was designed on a broad spectrum which could have eventually reached even world wide proportions. As a result of our analysis it was felt that immediate direction and attention should be channeled to the Apollo Program. This would comply with General Phillips' directive, and provide additional opportunity for evaluation before embarking on the more ambitious program. This Laboratory's concept will be to store, process, and retrieve parts information from selected and required sources applicable to the Apollo Program. This information will be used in the development of failure rates, establishment of qualification and achievement of parts standardization. To implement this approach a Laboratory PRINCE Steering Committee has been established which will determine potential users and evaluate user requirements. Periodically, the Committee will assess the value of PRINCE in terms of cost and Apollo Program benefits. The analysis, storage, processing and retrieving of data will be performed by the Computation Laboratory and Brown Engineering Company as a sub-contractor to SPACO, our support contractor. Present communications channels will be utilized for exchange of information between PRINCE and Apollo participants. ✓
2. GE/ESE: Subcontractor delivery of ESE panels, assemblies and components have taken a substantial up-swing. To date 55% of the IBM IU checkout station has been received in the depot area (building 4481). Problems in documentation, modification and modification kits are delaying the checkout and acceptance. Due to the volume of equipment being received a 24-hour operation has begun on checkout of panels and racks. Government Agency support has been arranged to absorb some of the workload. GE is establishing a 24-hour operation in the systems acceptance facility. A joint QUAL/ASTR team, although understaffed, is attempting to cover this operation. ✓



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1/11

1. GUIDANCE BACK-UP: At the 5/12 software presentation, Dr. Mueller raised the question of the planned effectivity of the guidance back-up. Our planning with MSC/MIT had been directed toward SA-503. Although the hardware implementation is provided, the computer programs must be developed and the overall systems compatibility verified. Dr. Mueller insisted that this capability be provided by SA-207. This presents a severe workload peak problem since 207 and 503 are practically concurrent and the system analyses will not be identical. The situation will be again discussed with MSC and MIT on Wednesday of this week. ✓

2. SOFTWARE PRESENTATION: In response to their request a presentation was made to Dr. Mueller and Gen. Phillips on 5/12 concerning our approach to development and verification of flight computer programs. The presentation was generally well received and the proposed schedule of development and thoroughness of verification were apparently satisfactory. ✓

NOTES 5/17/65 HEIMBURG

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1. S-1C

Modification to the deflector continues. The major modification involves support of the deflector sidewalls. This is being accomplished by a 24-inch-diameter pipe installed across the deflector opening and pin connected to the outside girder near the top. ✓

Primary work on the stage centered around preparation for activating the gox and GHe on-board systems. Due to missing qualified hardware, the gox and GHe will be vented overboard near the top of the respective propellant tank. It is planned that the four outboard engines will be gimbaled during the 40-second test scheduled for 5/20. ✓

2. F-1

Engine 3012 will be installed in the Static Test Tower West on 5/18. This engine has had a GG injector change, necessitating a hot fire test prior to installation on S-1C-501. ✓

3. S-IVB (SACTO)

A boattail environmental test was conducted on 5/13 and 5/14, using the battleship with engine area enclosed by a tarpaulin to simulate the inter-stage area. ✓

4. TEST LABORATORY SUPPORT TO MTF

Test Laboratory has begun to perform certain services for MTF to include component testing and also disassembly, cleaning, assembly, checkout, and testing of vaporizers, cryogenic pumps and valves, regulators, and filters. This effort has been planned to support MTF, and is expected to increase in volume and workload. ✓

5. MTF SHUTTLE BARGE, PEARL RIVER

MTF shuttle barge Pearl River, which is the YRNB 45, has been completed and was delivered to Michoud on 5/3. Test Laboratory has turned the barge over to Projects Logistic Office for operations. This barge will be used for transporting the S-11 and S-1C stages. ✓

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NOTES 5-17-65 HOELZER

Negative report.



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I fw SA-8: During the past week, the cryogenic loading test and the Flight Readiness Test were completed. Minor discrepancies both in the S-1 and S-IV systems were encountered but the tests were completed satisfactorily. An inverter failure occurred in the IU and replacement was required. A number of cables in the engine area and spider beam area of the S-1 stage had to be repaired. The wire was broken at the connector on several small flexible cables. These and other unsatisfactory conditions reported on S-I-8 are under extensive review at this time for feedback into other stages in process and for corrective actions. ✓

III fw S-IVB: The first S-IVB flight stage is at SACTO undergoing preparation for static test. Approximately 167 items of hardware are short at this time and effort is being expended to install these items as soon as they become available. It is still expected that stage build-up will be completed for start of checkout about the end of this week. ✓

II fw IU: The availability of the IU checkout station continues to be the pacing item. GE is working toward a target date of June 4 for delivery of the ESE to IBM, but our best estimate at present is June 10. We are continually analyzing the time and activity associated with checkout station installation and verification as well as the actual IU checkout itself. At present a late September or early October delivery date of IU-201 to the Cape is indicated. The exact date within this spectrum will depend on the actual ESE delivery date as well as the success experienced in installation, verification and checkout. ✓

SATURN IB Dynamic Test: The additional test time afforded by the modified plans for LC-34 wet test (i.e., use of the S-IB-1 flight stage in lieu of the S-IB-D/F stage) permits tests to be conducted to determine the model shapes while the vehicle is rigidly fastened at the base. There had been no apparent test opportunity to determine this data until this time became available in the dynamic test program. ✓

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1. Launch Vehicle Cost Effectiveness: I calculated our nominal launch vehicle performance for the year 1964, all normalized for a 300 N. Mi. orbit and all launch vehicles carrying their nominal payloads. This is a comparison factor generally adopted for indicating a country's "space trucking capability." We had 57 successful launches (DOD plus NASA) which carried - with the definition above - 177,200 lb into the standard orbit. Five launches were unsuccessful. If one adds up all the production and launch cost (excluding development cost), 390 million dollars for direct operating cost is obtained. The cost effectiveness of our mixed national booster stable thus results in  $390 \times 10^6 / 177,200 = 2,200$  \$/lb.

It might be interesting to compare this with our predictions for the year 1964.

Date of Prediction	Equivalent Orbital Payload (lb)	Average Cost Effectiveness (\$/lb)
1959	700,000	1,300
1960	300,000	1,600
1962	180,000	1,900
1964 actual	177,000	2,200

The reasons for being off in our estimates were the general cost increases and the general schedule slippages, primarily in the Centaur. We have learned from this to be more pessimistic in our estimates and not to use "official" schedules for this purpose any longer. ✓

2. Center Planning: We are marshalling all our resources to crank out numbers and viewgraphs for the next Executive Board meeting. Everything is not coming out as expected, but most of it makes sense. For this Friday afternoon I can promise an interesting discussion, and we want to point out that we can provide only "insight" into the problem. Do not expect us to get valid answers. These can be obtained only by adding a lot of individual and group judgments. ✓

NOTES 5-17-65 KUERS

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1. Delay Status of Centaur/IB Project: Release of preliminary documentation and design data for cylindrical shroud, nose fairing, and payload adapter is already several weeks in delay preventing timely start of tooling design. The latest PERT readout from 4/27/65 shows the release of the preliminary program definition is about twelve weeks late. There might be some truth in this readout since verbal information from P&VE indicates a further documentation release slip of 4 weeks. Our fabrication schedules for this program are so tight that it will not be possible to make good later for the time lost now. Schedule control must start now in the program and everybody must become schedule conscious starting with IO, design, P&C, ME and quality control personnel. ✓

2. Engine Modification and Insulation Problem for 501: Lack of engineering change documentation due to interface problems between Boeing and Rocketdyne is causing serious delays in engine modification for 501. This again has an affect on the design of the insulating cocoon for the engines. We work closely together with IO, P&VE, Boeing and Rocketdyne to avoid schedule delays in this area. Four engines have been received from Rocketdyne to date. ✓

3. Development of Tube Flaring Machine: We have developed a tube flaring machine which can be used as a mod kit to conventional Leonard flaring machines and which will produce tube flares according to the MC-146 specification. This was a much needed development since it was just not possible to produce tube flares which would meet all specification requirements. This machine is ready for use on 501 and is being offered to our prime contractors. We are presently working on a fully automated flare control mechanism which would eliminate the human element entirely. ✓



B 5/20

7/9/14

1. HUMAN RESOURCES SURVEY - The MSFC Human Resources Survey report was handcarried to MSF and Office of Programs last week by Bill Rutledge. This was the first MSF center submission to reach headquarters. ✓

Rutledge learned from Bark Kahao that MSF has briefed Dee Wyatt on MSFC's average salary requirement for FY 65, and Wyatt is reported to be preparing a briefing to present our request to Mr. Hilburn. ✓

2. POP 65-2; REVIEW BY HEADQUARTERS - An MSF team headed by Col. Seccomb and Tom Newman was here May 12-13 for review of MSF R&D POP 65-2. Projects covered were Saturn I, IB, V and Engines. MSF in-flight experiments were also discussed briefly.

The review was in more depth than previous quarterly reviews. Heretofore, the representatives were primarily concerned with dollars, cost and obligation plans; in this review there was greater interest in the effort and hardware being bought with the funds. ✓

The AO POP 65-2 review is scheduled to be held on May 17-18. ✓

3. DOD CONTRACT ADMINISTRATION SERVICES SUPPORT - The briefings by Bothmer and company on operation of the new DOD Contract Administration Service (Project 60) were attended by some 50 MSFC people, and were very informative. ✓

We have discussed with Mr. Gorman, the establishment of an MSFC point of contact for DOD support; a paper is now being staffed to announce the appointment. ✓

4. AES PAYLOAD INTEGRATION TASK TEAM - Bud Abbott and Ray Butler attended the initial meeting last week of the AES Payload Integration Task Team. This team was organized by MSF to define the scope of the AES Payload Integration Tasks, recommend preferred locations at which to perform the integration tasks, and recommend the management relationships among headquarters, field centers and contractors involved. The task team is working toward a target date of June 14 to furnish information to Dr. Mueller for use at the June MSF "hideaway" meeting. ✓

B 5/20

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1. REVIEW OF SINGLE SUPPORT CONTRACT STATUS: Action is underway to set up a series of meetings between the Responsible Officials and the contractors of the Single Support Contracts. The purpose of these meetings is to review the transition to the new contractor and to discuss any significant problem areas, such as recruitment of personnel, transfer of individuals from the old contractors, Incentive Award criteria, and general operating procedures under our current policy. These meetings will be scheduled for approximately two hours per contract and will be spread over about a 30-day period to allow attendance by top level MSFC management. Schedule and agenda will be forthcoming in the very near future. ✓
2. HUMAN RESOURCES STUDY: The recently completed Human Resources Study indicated a number of personnel and organizational adjustments which will require formalization in the MSFC Management Manual. R-RM has reviewed these items, compiled an action list for all R&D Operations elements, and will followup until completion. ✓
3. PROJECT SUPPORT AGREEMENTS: Response has been received from I-DIR on the R&D Operations/Industrial Operations Policy for implementing Project Support Agreements, reference your Guidelines of February 19, 1965. There appears to be basic agreement on the approach, with only minor changes required, and the Policy will soon be prepared in final form. In support of that Policy, necessary staff work has been initiated to obtain a modified coding structure from Mr. Hardeman. That structure requires finalization prior to formal issuance of the Project Support Agreements. It is planned that the IU effort in R&D Operations be the first project to which the support agreements apply in order to test and permit evaluation of the effectivity of the proposed system. An internal R&D Operations procedure has been drafted to implement the Project Support Agreements in the laboratories. ✓

NOTES 5/17/65 RUDOLPH

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1. Control of Engineering Changes - A Saturn V Program Directive on Engineering Changes and Modifications, has been issued (Saturn V Program Directive Number 12, dated May 6, 1965). The purpose of this Program Directive is to:

a. Implement your April 8, 1965, direction on Control of Engineering Changes.

b. Restrict Engineering Changes on Launch Vehicle SA-501 to ABSOLUTELY MANDATORY, make-to-work, make-to-fit changes.

c. Define engineering change procedures for Launch Vehicles SA-502 and subsequent.

d. Provide direction on Saturn V Launch Vehicle Performance and associated weight reduction engineering changes.

e. Establish procedures for handling engineering changes not in direct support of current program and state-of-the-art changes. ✓

III for 2. S-II Battleship Status - A 10-second cluster firing was accomplished on May 7, 1965. Preliminary firing data evaluation was completed on May 12, 1965, and the results were very satisfactory. A 20-second cluster firing is scheduled for May 28, 1965. ✓

3. S-II-S Structural Test Failure - A proposed fix for the previously reported thrust structure failure will be submitted by S&ID in approximately two weeks. Three fixes are to be considered: (1) fix to S-II-S (2) fix to S-II-1, S-II-2, and S-II-3 (3) redesign for S-II-4 and subsequent stages. Modification for flight stages appears possible without significant schedule impact. ✓



NOTES-5-17-65-SHEPHERD

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1007/14

Corps of Engineers Officer Replacement - As reported to you earlier General Welling is retiring from Service July 31, his replacement as Chief of the South Atlantic Division is Brigadier General Clarence C. (Stumpy) Haug. General Haug served under General Medaris, 1958 through 1961. We should expect to receive better support from the Atlanta Office. ✓

Sleep

GEM had promised me to talk to Gen. Wilson re postponing some of the other C of E officers transfers. Has this been effective?

B

B 5/20

109/19

1. AES: Within the next few weeks, contractor proposals for four study contracts will be evaluated: Surface and Subsurface Probes; Environmental Effects on Instruments; Emplaced Scientific Station; and Lunar Drill. These proposals will complete RPL'S FY 65 contract study program. ✓

The May 4-6 AAS meeting on Apollo Extension Systems had strong participation by MSF (Mueller, Dixon, Evans, Beattie) and SSA (Foster, Badgeley). The NAA studies were presented by Will Foster. Mueller gave, during his dinner talk, the status of the Apollo-SATURN and a strong plea to the AAS audience to come up with payloads and missions. The meetings were well organized and gave an excellent picture of the post-Apollo programs and the present thinking. None of the projects were favored over the other by the NASA Headquarters people. Dr. Mueller mentioned in his talk the Marshall symposium on lunar experiments as a milestone and also spoke highly of the (present) AAS symposium which should help to prepare us for the next step in the national program. ✓

II *fw* 2. PEGASUS A: There has been a very noticeable decrease in the quality of the memory data being received since May 8. A call from Bob Lake of the Project Office from SATCON revealed that bits are shifted from 3 to 15 places and that the memory "locked" during some passes i. e. the same identical data had been read out on two different passes. Strangely enough, the electron spectrometer seems to have begun operating again.

Pegasus-B data reduction computer programs are in the final stages of checkout. The real-time data program is being modified to plot torque angle, or deployment angle, vs. time. Pegasus-A data are being used for checkout of Pegasus-B programs. Several computer runs were made for the Project Office on Pegasus-B orbits for launch window considerations. ✓

3. FY 66 SRT/ART PROGRAM: The FY 66 OART Guideline Program will be sent to Washington this week. It is one month late due to the late task submission by the Laboratories, and because of continuing severe shortage of personnel in the Consolidated Research Program Office. The staffing of this office is still stalled by reviews, PREP studies, and unending administrative delays. ✓

4. IONOSPHERE BEACON: Our Green Mountain Station has received good signals from the latest (Explorer 27) Satellite which carries a beacon for ionosphere measurements by RPL. The recent installation of a 360 MHz preamplifier and helix antenna on Green Mountain has improved the signals from Explorer 22 which we are using in the same ionosphere study.

E.S. I understand Pegasus B must be launched at 2130 am because it uses the same frequency as Pegasus A. Why is that so? Can't they drift closer after a few weeks, thus becoming harder to distinguish? How about Pegasus C? Same mess? B

May 24, 1965



B 5/24

NOTES 5/24/65 BALCH

1. Construction - The accelerated pace of construction is evident in all the key areas of the site. The Corps is delivering completed portions of work according to the requested schedule. Except for the field welding of T-1 steel pipe in the high pressure gas systems, the desired rate of construction completion is being achieved. More trained welders are still needed, and some are being trained. ✓
2. Activation - We have been unable to capitalize on some of the accelerated completion of piping systems. The one cleaning subcontractor to GE has not performed at as fast a rate as the systems are being completed by the constructor. By next week we expect to have a second cleaning contractor at work to supplement the effort. These are the pacing systems for the first S-II position. ✓
3. PERT - The desired level of detail in the S-IC PERT network will be reached next week. From this network, desired dates for completion of construction will be selected. ✓
4. Labor Relations - There is a disturbing reluctance on the part of representatives of the construction unions, and the Mobile District, to include NASA and the industrial unions as active participants in the site Labor Relations Committee. At a regular meeting of the Committee on 20 May, representatives of the Boeing Company and of the International Association of Machinists took the position that the Committee must be broadened to include the industrial side. The Committee finally agreed after a great deal of foot-dragging on the part of the construction crafts. ✓
5. Organizational and Operational Concepts - Following extensive analysis and discussion with my staff and with the contractors' site managers. I described my concept to my staff on Friday, 22 May. They are now adding details to the concept prior to implementation. ✓

B5/29

F-1 ENGINE Negotiations to incentivize the development contract commenced May 13. Thus far, we have obtained detailed agreement on the Model Specification and Reliability Demonstration Procedure and have obtained general agreement on the Scope of Work. Relatively few major matters remain to be agreed upon. MSFC has made its first incentive package offer to Rocketdyne and Rocketdyne has counteroffered. These offers are within reasonable range and we expect to negotiate the differences without major problem. ✓

S-IVB ULLAGE ENGINES - ROCKETDYNE/GEMINI During the preliminary checkout of vibration equipment and the simulated APS Module vibration fixture, two fired MSFC Qual engines were subjected to S-IVB vibration spectrum which resulted in failure of the engine metal shell at trunnion (shell thickness .090") and nozzle exit flange (shell thickness .020") areas and the bellows in the module propellant inlet lines. The essential vibration problem is the high amplification of the input vibration by the module structure. In some modes of vibration certain parts of the engine experience amplification factors of 10 times the input vibration. Investigations are underway to isolate the mode of failure and the proper corrective action to be undertaken prior to starting the formal Qual vibration and shock testing on the fourth MSFC Qual engine. No delay of Saturn V/S-IVB is presently anticipated. ✓

RL10 ENGINE Firings on four RL10A3-3 engines demonstrated specific impulse between 441 and 444.2 seconds. The sixth A-3-3 experimental engine completed two firings in checkout of production engine test stand. This engine is built to the prototype Bill of Material configuration. ✓

The test program for E-5 (Environmental 2 Engine Stand) to determine flow rates and thrust levels during blow-down of the Centaur propellant tanks through the engine is being formulated. Testing will be initiated during the first part of June. ✓

J-2 ENGINE Both production engines for the FRT program are in acceptance test. The formal FRT program will be initiated when the first engine completes acceptance requirements. ✓

Negotiations to convert the J-2 production contract from CPFF to CPIF are progressing. They should be completed this week. ✓

Testing at S-IVB restart thermal conditions is progressing. Adequate engine and thrust chamber preconditioning is being accomplished by additional fuel lead. ✓

H-1 ENGINE An outboard H-1 engine on Vehicle SA 202 was damaged at Michoud on May 21 when a Lift-A-Loft struck the Thrust Chamber. A complete damage report is not available at this time, however, at a minimum, the thrust chamber must be replaced and the engine static tested. A spare engine is available at Michoud for replacement purposes. Estimated time for installing the spare engine in the vehicle is one week. ✓

GENERAL I will be at Rocketdyne May 27 to participate in briefing the 38 presidents or the vice-presidents of major Rocketdyne vendors on the over-all Apollo Program. This meeting was initiated as a result of Dr. Mueller asking various Corporate Presidents at the Apollo Program Managers and Apollo Executive Group with Prime Contractors Meeting in Florida two months ago to get together with their major suppliers and impart the importance of the Apollo Program to them. ✓

L.B.  
It's about time to have CCSD pay for this kind of damage 3rd time!!  
B

B 5/24

1. BLAST HAZARDS TEST: The blast test of the S-IV Hydrostatic Stage at Edwards Air Force Base is scheduled for approximately 6-20-65. This is a part of our blast hazards evaluation program. ✓

2. CENTAUR INTERFACES: Preliminary documents have been prepared listing the interface items and mechanical interface responsibilities for the following items:

- a. Centaur to Instrument Unit Adapter
- b. Centaur to Payload Adapter
- c. Instrument Unit to Instrument Unit Adapter
- d. Centaur to Shroud
- e. Shroud to Ground Support Equipment

Overall interface responsibility matrices for the Saturn IB/Centaur are being developed. A preliminary draft will be available within 2 weeks. ✓

3. S-IC STAGE HYDRAULIC SUPPLY AND CHECKOUT UNIT: The S-IC ground hydraulic supply and checkout unit #2 (manufactured by Greer Hydraulics, Inc.) successfully supported the onboard hydraulic system of the S-IC-T during the static firing conducted on 5-20-65. This was the first use of this system, which will later support the actual Saturn V launchings at Kennedy Space Center (KSC). Preliminary results of the test indicate good response of the unit in meeting the demands of the onboard hydraulic system during primary and mainstage ignition. ✓

It should also be noted that a milestone has been accomplished on the S-IC ground hydraulic supply and checkout unit #1. The first 500-hour test program has been completed in which approximately 4,000 launch cycles were successfully simulated. ✓ A second 500-hour sustained test program is now scheduled to further prove the design integrity of this unit. ✓

4. S-IVB/GEMINI ULLAGE ENGINE QUAL PROGRAM: Efforts to verify the capability of the GEMINI engine to fulfill the S-IVB Auxiliary Propulsion System vibration requirements have begun by testing of two engines. The pre-QUAL testing was conducted using two engines previously fired during the formal QUAL portion of the program. The first engine was vibrated in three axes before cracks were found in both the engine trunnion mounts and the exit flange. The second engine was vibrated in only the longitudinal axis before a crack was noted in the exit flange. A repair of the crack is being attempted in order to continue testing to determine if the flange failure in the first engine induced the failure of the trunnion mounts. The attempt to formally qualify an unfired engine will not be attempted until a thorough evaluation of the preliminary testing has been completed. ✓



B 5/24

1. S-I/IB

Status of S-I-10 - Stub fin installation complete. Final NASA shakedown in progress. All hydraulic actuator cable connectors are in process of being replaced. ✓

Status of S-IB-1 - Optical alignment complete. Working modifications on interstage electrical cables and camera ejection system. Clearing discrepancies from static fire. ✓

Status of S-IB-2 - All engines are installed and engine optical alignment in progress. Installing tubing and electrical cables to engines. Modifications being complied with. Stage is approximately 80% complete. ✓

Status of S-IB-3 - Wrapping and installation of wiring harnesses. Modifications being incorporated. Strain gages being installed. Engine shakedown by contractor inspectors in progress. NASA electrical shakedown continuing in some areas. Stage is approximately 86% complete. ✓

Status of S-IB-4 - Cluster operation continuing. LOX tank # 4 has been installed. In process of installing LOX tank # 2. ✓

2. S-IC

General Electric Support - Boeing is under contract to fabricate 3,000 cables for G. E. in support of Saturn V effort; 1,138 cables have been completed with the remaining 1,862 to be completed approximately July 15, 1965. The July 15 date does not meet the June 4 contract completion date. The reason for the delay is due to the lack of G. E. engineering documentation with which to fabricate the remaining cables. It is expected that Boeing will receive additional follow-on work from G. E. to support the Saturn V program. ✓

"D" Vehicle

Forward Skirt - Complete, painted and ready for final assembly installation when needed.

Thrust Structure - In the final assembly position. Being stuffed with components.

Fuel Tank - In final assembly position and connected to both thrust structure and intertank. The LOX ducts have been installed.

LOX Tank - Located in Hydrostatic Position (VAB) has passed hydrostatic test operation and is presently being cleaned. The next operation will be calibration. The "D" LOX Tank is approximately 23 days behind schedule.

Vertical Assembly - Thrust structure, fuel tank, and intertank have been mechanically connected. ✓



B 5/24

1. DAC Space Station Briefing - Upon request by Dr. Rees, DAC made an excellent presentation on their plans for manned space systems. To strengthen their research and development efforts for manned orbital systems, DAC will reorganize manpower and facilities. An extensive study of the experimentation requirements for orbital laboratories and an interesting concept of logistics spacecraft support for orbital stations were presented. DAC will give you a similar briefing in their facilities during your next visit to Santa Monica. *By all means, I'm very eager to get it*

2. Saturn V Logistics - IO has requested R&DO review of the Statement of (Boeing) Work for logistic support engineering to assure the compatibility of this task with the Saturn V operations analysis (also Boeing) in order to avoid unnecessary overlap. An early go-ahead is expected. ✓

3. ICD Reviews - The notes of 5-17-65 referred mistakenly to a matrix for SA-207. This should have read "Matrix for SA-201." ✓

The announced ICD reviews for the Launch Operations Panel have been scheduled for Thursday & Friday of this week at the Cape, in conjunction with a Panel meeting which had previously been scheduled. Attendees from IO and R&DO Systems Engineering have been invited. ✓

4. Hydraulic Actuator Systems - A complete review as requested by Dr. Rees will be held on 5-28-65. The review will cover history, technical design, qualification status, delivery of production items and a discussion of problem areas. ✓

5. PRB - In the last meeting on 5-4-65, a full presentation of the modified flight safety sequencing for 201 was presented by our Electrical Panel chairman. Deactivation of numerous interlocks for this flight was explained in detail in order to demonstrate our philosophy that 201 should be kept flying as long as possible to provide maximum R&D data. ✓ (Internal MSFC coordination between panels regarding this problem is underway.) ✓

Alternate missions - Phillips requested the Flight Mechanics Panel to take the lead. He will setup a meeting with Bellcomm and the Center to discuss inflight contingencies. ✓

Standardized coordinates were presented by Bellcomm. MSF will coordinate the standards throughout NASA to broaden the application to other programs. Center management will be responsible for determining implementation in the Apollo Program. ✓

*How do these standardized  
K.D. coordinates jibe with the  
ones recommended by Dr. Hoelker?*  
B

NOTES 5/24/65 GEISSLER

B 5/24

1. S-IVB LH<sub>2</sub> Slosh Baffle Design: Re: your question on Notes 5/3/65, item 2, subject as above (copy attached): yes, the S-IVB LH<sub>2</sub> tank baffles referred to are the nylon slosh baffles which were installed to counteract sloshing in orbit, as was exhibited in recent Centaur failure. ✓
2. Joint Operations Group Meeting: The meeting was co-chaired by Gen. Phillips and Mr. Christensen and was held at MSFC on 5/19. Most agenda items were concerned with ground network support and communications. Shields (ASTR) presented the Saturn IB sequence of events. Dr. Downs (Bellcomm) gave a comprehensive briefing on Saturn V vehicle-ground command interfaces through orbit insertion. Gen. Phillips concluded the meeting with requesting all operations personnel to be aware that the present launch schedules will be held or even advanced (specifically referring to the lunar landing.) ✓
3. SA-8 Wind Monitorship: A meeting chaired by Mr. Lindberg was held on May 18th to discuss the prelaunch wind monitorship program. The FPS-16 winds which will be received here at T-12 1/2 (1:00 p.m.) and T-3 1/2 (10:00 p.m.) will definitely be analyzed. Other wind data recorded at 3 hour intervals will be studied and run at option. Test runs have been made using the stacked wind editing and prelaunch wind trajectory programs for SA-8 monitoring. Specific capabilities which have been tested are card input of wind data, unedited FPS-16 transmission, edited GMD and FPS-16, and the no wind standard. The programs should be considered operational and are being continuously exercised up to launch. ✓
4. A.E.S.: The transfer of Georg von Tiesenhausen and some of his group to Marshall and their temporary assignment to Mr. de Fries' A.E.S. operation is in process. Efforts are being made to provide physical space for the group in Bldg. 4200.



B 5/24

1. S-IU INSTRUMENT UNIT: The decision to use mechanical fasteners on the Saturn IB and V Instrument Units impacted the S-IU-201 schedule to the extent that the unit is now scheduled to complete assembly August 4, 1965. In order to minimize impact IBM has begun two 12-hour shifts in the structural assembly area. Government Inspection Agency and R-QUAL personnel are required to provide coverage for the 24-hour per day operation, which is scheduled for two weeks duration. Due to workloads in other areas, it will be necessary that, for the most part, we utilize overtime to provide the additional effort. ✓

2. S-II PROGRAM: S&ID foresees difficulty in meeting scheduled delivery dates for Mississippi Test Facility GSE. To overcome this difficulty they are preparing a proposal that encompasses a 7-day per week, three shift per day operation to extend through July, reduction in testing requirements, and providing their Quality Engineers with "buy-off" authority. The proposal has not been officially presented to NASA, however, we are aware of the various elements of the proposal and no serious problems are anticipated in providing S&ID the required quality coverage. ✓

3. S-IC LOX TANK: We experienced a problem of contamination in the SIC-1 Lox Tank. In order to assure that the Lox Tank calibration operation is successful, it is necessary to actuate the liquid level probes during hydrostatic testing. Accordingly, during testing of the S-IC Lox Tank sodium dichromate concentration was increased in order to lower water resistance and thereby actuate the probes. Chemical incompatibility of sodium dichromate and fluorescent dye when combined in the concentration required for the Lox Tank, resulted in deposition of a precipitate on the internal surface of the tank. After extensive rinsing operations, ME Laboratory was able to remove almost all of the contamination. Boeing has agreed to waive the slight contamination remaining. This costs approximately four days time, however, the tank is still on the official schedule. ✓

J.G.

Why did Lucas' Lab not find this incompatibility in advance? Our procedures should not permit us to discover such things with empty million dollar hardware!

Please take up with Fred Cline & General Kues

B

1. IBM STATUS REPORT: Former schedule commitments are still valid, in particular the components for the 8/20 delivery date are slightly ahead of schedule. ✓

2. ASSESSMENT OF GE ESE FOR SA-201: In spite of the efforts of the MSFC ESE Assessment Team, GE is forecasting delivery dates that are not agreeable with the present IU/Checkout, SDF (Breadboard) and VLF-34 schedules to meet the presently planned SA-201 launch date. ✓

B5/24

1. S-1C:

A successful 41-second mainstage duration test, test S-1C-06, was made on 5/20, at 2:58 p.m. The new features added for this test were: All four outboard engines gimballed +2 degrees at 0.5 c.p.s., 90-second automatic countdown, and lox tank onboard pressurization system. All performed satisfactorily. The 30-cycle oscillations were evident in the fuel system for all engines. However, sustained oscillations were only in engines at stage positions 1, 4, and 5. The pump inlet pressure was 23 p.s.i.g. for this test, compared to 21 p.s.i.g. for the previous test. Post-test inspection revealed no damage to the stage or engines. ✓

2. SATURN V HOLDDOWN ARMS:

Due to recent failures of the Saturn V holddown arm upper link while load testing (Reference NOTES 3/1/65 HEIMBURG and 3/29/65 HEIMBURG, copy attached), the link was redesigned and the material changed from a casting to a forging. Testing was resumed on 5/19, with the new upper link forging. ✓

3. S-11:

Due to difficulty in retaining a vacuum on the stage propellant transfer system (SLEDS), and the unavailability of the pre-pressurization solenoid valves, the cryogenic tanking test scheduled for 5/24, has been cancelled and the 20-second firing has been scheduled for 6/3. ✓

4. KSC BARGE:

The vessel, in tow by the shipyards contract tug, struck a submerged object in the Gulf of Mexico tearing a hole in the bottom 65 feet long and approximately 1 foot wide. Owing to double bottom feature, vessel was in no ~~danger~~ damage of sinking. ✓

Ship will be drydocked 5/25, at Jacksonville, Florida, for inspection and repairs. No predicted schedule impact. ✓

ATTACHMENT TO DIR & R-DIR (RANDOM MOTION SIMULATORS (SATURN V GSE)



1. SINGLE SUPPORT CONTRACTOR: Final agreement was reached with the General Electric Company and the new contract should be consummated on or about June 21, 1965. ✓
2. PROJECT MAC: Professor Fano, Director of Project MAC at the Massachusetts Institute of Technology, will give a presentation on the "Use of a Computer System as a Public Utility." The presentation will be from 10:00 to 11:00 a.m., June 8, 1965, in the Saturn Evaluation Room, Building 4663. Professor Fano will demonstrate the capabilities of the Project MAC Computer Center by calling, modifying, and executing programs from a remote console during the presentation. ✓
3. AUTOMATIC CHECKOUT: Design specifications for ATOLL II are complete and ready for implementation. After a meeting with Mr. H. Fichtner, Automation Board Chairman, Computation Laboratory, Quality and Reliability Assurance Laboratory, and Astrionics Laboratory, Mr. Fichtner coordinated the situation with KSC and Astrionics Laboratory and is in the process of issuing a directive to Computation Laboratory to implement ATOLL II for the Cape with a target date for completion of about January 16, 1966. ✓

B 5/24

IU-8: Intermittent shorting of a phase-to-ground of the No. 2 inverter was encountered during the Flight Readiness Test at KSC on May 14. The inverter and phase detector in the ESE were replaced and the countdown was continued without further indication of shorts. Bench testing of the inverter at KSC did not reveal any malfunction within the unit. A review team consisting of Mr. W. K. Simmons, I-I/IB-U, Mr. H. Fichtner, R-ASTR, and representatives of KSC met Friday to analyze the situation. Recommendation of this team was to proceed with the countdown. ✓

IU-201: As a result of the debonding of mounting brackets which occurred during vibration testing, it has been decided to secure all mounting brackets to the structure with mechanical fasteners. Inserts are being installed to accomodate this change. The impact of this change will be evaluated at the IBM Review 5/27/65. ✓

CCSD No. 3 B S-IB-2: CCSD reported damage to the No. 3 Engine on S-IB-2 at Michoud on Friday. This stage has completed pre-static checkout and was being prepared for shipment to MSFC. The damage consisted of what appears to have been caused by a fork lift operating in the area. The engine has been removed and a spare engine is to be installed today, 5/24/65. The damaged engine will be sent to Neosho for repairs. This is the second such incident with CCSD at Michoud and it is under extensive investigation at this time. No schedule impact; stage to be shipped June 7 on schedule. ✓

H. Weidner FM B S-IVB: As you know, I just finished a ten day trip to Sacramento in connection with the preparation for the first S-IVB static firing. I am very impressed with the DAC operation as compared with their operation during S-IV-5 and I am also impressed with the operation of our field office and the way it works smoothly with the Engine Office and the laboratory representatives. ✓ One thing disturbs me and I have mentioned it several times before, the laboratories are now geared to work on S-IC and MTO. This is affecting their support of SA-201. There were no laboratory key personnel at SACTO and the laboratory help is now made up largely of contractor personnel. For instance, one laboratory was represented by five contractor personnel all of whom are relative new to the game. They were there to be briefed and to learn. Obviously, this type of help will not benefit the S-IVB-1 static firing very much. ✓



1. Earth Orbital Operations Study Results: Major reviews of the Earth Orbital Studies were held the week of May 10. Reports were received on the following studies:

Advanced Orbital Launch Operations (AOLO), LTV, Mid-Term  
Space Checkout and Countdown Equipment (SCALE), Lockheed, Final  
Orbital Launch Facility (OLF), Boeing, Mid-Term  
Cryogenic Tanker, Lockheed, Final

These studies are all part of what we call the OLO package. One of the most important pieces of information coming from the package is a comprehensive RDT&E plan which we expect to shed some light on such questions as: (1) How do we get to an initial orbital launch capability? (2) What are the critical elements in this development? (3) What requirements are to be placed on early Orbital Research Laboratories?

LTV will integrate the inputs from the other studies to provide us with this plan. A rough cut at the manhours in orbit to develop and train for Orbital Launch Operations has shown some 9,000 hours are required. AES (2 men for 45 days) cannot logically provide that kind of orbital training. It adds up to a strong case for 170 MORL size facilities early in the 1970's.

2. Planetary Study Results: On May 13 the final review of the GD/FW study of "Mission Requirements for Manned Mars and Venus Exploration" was held here at MSFC. This review was attended by representatives from NASA Headquarters, Ames, Langley, MSC, Kennedy, and our labs.

This study concentrates upon relative evaluation of alternate possibilities (both with regard to a single mission, e.g., chemical vs. nuclear solid core, and with regard to various mission sequences, e.g., flyby-orbital-lander vs. orbiter-lander-lander).

Principal accomplishments were: (1) Determination of scientific payload for various missions, (2) analysis of failure, abort, mission risk, (3) comparative analysis of cost, schedule, yield, and value (based, in part, upon group judgement), (4) the numerical analysis is based upon a few sample cases; the methods, however, are broad and general.

Major Conclusions were: (1) For only a few uses, low mass highly sophisticated payload systems cannot be justified economically; (2) In the overall development program for the vehicles considered, the "pacing item" will be the development of an advanced nuclear propulsion system; (3) The probability of mission success for the vehicle concepts analyzed was estimated to be in the order of 0.40. However, the probability of crew survival was about 0.85 due to the possible abort modes. (Here mission success means the successful completion of all operational and data gathering requirements for the mission.); (4) On the basis of the ranking in the mission mode/vehicle analysis, the most attractive mission vehicle appears to be one employing an advanced graphite core, nuclear propulsion system, and a solar heat exchanger system for perihelion braking. The Venus "swing-by" mode was not considered at this time. This is expected to be at least equal to the perihelion braking. (5) The estimated costs of the planetary missions are: Flyby, \$4.3 billion; Orbiter, \$19.2 billion; Landing, \$22.7 billion; (6) Based on cost, cost effectiveness, and value, the most desirable mission sequence appears to be an early orbiter followed by subsequent landing missions.

The above conclusions are based on several initial assumptions: (1) The comparisons were not based on the full spectrum of possibilities; (2) A 40 ft. diameter modified Saturn V was supposed to be available at no added development cost; fifty percent of the Post-Saturn R&D was charged to the planetary program; (3) Funding for the manned planetary program was assumed to be unavailable before 1973. ✓

HHA  
Can I  
get a  
condensed  
1 1/2 hr  
briefing  
on these  
findings?  
B



1. S-IC-501 Schedule Control: The count of undelivered components (nuts and bolts not included), based on Boeing's IBM print out for 501, shows the following picture during May:

		Decrease	Increase
Undelivered line items as per May 3:	657	-	-
Undelivered line items as per May 6:	754	-	97
Undelivered line items as per May 12:	654	100	-
Undelivered line items as per May 13:	788	-	134
Undelivered line items as per May 18:	759	29	-
Undelivered line items as per May 19:	992	-	233
Total		129	464

This increase of undelivered parts makes a firm planning of workload impossible and is the result of lack of control for documentation releases. We never knew how complete the design was and how many new drawings and parts would be added next week.

We have now succeeded, for the first time, to establish a documentation cut-off date for 501. Boeing engineering has now, on our request, established a list of undelivered documentation for 501. In this compilation 284 undelivered drawings, engineering assembly parts lists (EAPL's) and EO's are listed, including all outstanding documentation for approved CAM's, and with firm issue dates for each document.

An exception is only made for the latest CAM's for engine modification and instrumentation for which sketch documentation will be created by the Boeing design office in our assembly shop, building 4705. This documentation cut-off is a great step forward toward the necessary coordination between design and manufacturing schedules.

Other good news for 501: The Lanager/Carter Selenoid valves have now passed all qualification tests; this allows us to relax or cancel the back-up solution of using Marotta valves. ✓

2. Scholastic Award for ME Employee: Mr. F. J. Jackson, a young engineer in our Manufacturing Research and Technology Division, has received a General Master's degree from the University of Alabama, based on a study performed within the Welding Development Branch. His excellent quantitative study of time-temperature effects in 2219 aluminum welding has furthered understanding of the TIG welding process. Mr. Jackson will receive national recognition by presentation of his thesis at the American Welding Society fall meeting in Birmingham. ✓

*Congratulations*  
B



NOTES 5/24/65 MAUS

1. APOLLO COST STUDY - At the May 18 Management Council Meeting Dr. Mueller asked Mr. Lilly to develop answers and recommendations to the following questions on the Saturn IB Vehicle cost estimate:

- a. Why has the estimated cost of the Saturn IB Vehicle increased under the Apollo Cost Study to approximately \$40 M from the approximate \$20 M estimated in the National Launch Vehicle Cost Study?
- b. Shall NASA use the higher cost estimate, and would this action be in the best interest of NASA?

Dr. Seamans, his staff, and Mr. Lilly held a meeting on May 20 to discuss and resolve these questions, and came up with the following conclusions and recommendations:

- a. The Apollo Cost Study estimates are higher because they covered costs for payload integration, design changes, static test firing of each stage and contractor's fees, which were not included in the National Launch Vehicle Cost Study.
- b. No changes were made in the Apollo Cost Study. It was decided that NASA had more to gain using realistic cost figures than to repeatedly increase the estimated costs. Based on this decision, Dr. Seamans released an advance copy of the Apollo Cost Study to BOB on May 21.
- c. The cost report is expected to be completed in about two weeks, and phrased so that the cost will apply to specific schedule and groundrules listed in the Apollo Cost Study. Any changes in these conditions will alter the current estimated cost.

Mr. Malaga is expected to visit MSFC in two weeks to deliver the completed study and backup data. He will also discuss the high cost of I.U. and S-IVB, which, in his opinion, are the major problem areas in the Saturn IB Vehicle Study.

2. MSC EXPERIMENTS PROJECT OFFICE - MSC submitted a proposal to Dr. Mueller for the establishment of an office with responsibilities to represent MSC agency wide in the evaluation and selection of experiments to be flown on manned space flight missions and to develop, implement, and integrate MSC experiments. Mr. Robert O. Piland, currently Dr. Shea's deputy, is designated to head the proposed office. He will also be on Max Faget's staff and, therefore, will be able to focus all R&D activity related to experiments and assure that proper support to experiments is maintained. The new office will provide a focal point for planning, coordination and management control over all activities involving experiments for manned spacecraft missions.

H.M.  
Let's discuss  
this again.  
Please make  
up for them.  
Bonnie  
B

H.M.  
Let's discuss  
this too  
B

NOTES 5-24-65 McCARTNEY

B 5/24

Negative Response.



1. S-IC-1 Stage Status:

- a. The Thrust Structure/Fuel Tank Assembly is now in the horizontal assembly with component installation progressing. ✓
- b. The LOX Tank hydrostatic testing was completed on May 15, 1965 - two weeks ahead of schedule. ✓

2. S-IC-D (Dynamic Stage) Status:

- a. The Thrust Structure to Fuel Tank joining has been completed.
- b. The Thrust Structure/Fuel Tank assembly to Intertank joining is in process.
- c. The LOX Tank is in hydrostatic testing.
- d. The delivery date of October 15, 1965, to MSFC is still firm. ✓

3. S-II Battleship Stage Status:

- a. A 20-second cluster firing is scheduled for June 3, 1965. ✓
- b. Plans are to use the LOX Recirculation System instead of overhead bleed as used in the past. ✓

4. S-IVB/V-1 Stage Status: Structural assembly operations are on schedule. The stage is undergoing final cleaning prior to installation of LH<sub>2</sub> tank insulation. ✓

5. S-IVB Investigations Resulting from Instrument Unit Bonding Failures:  
Reference your annotation to Notes 5/3/65 Rudolph, copy attached.

Douglas Aircraft Company has designed the S-IVB Adhesive Bonded Clips to a very low stress level. ✓ The bonded area of each clip is capable of carrying a load 15 to 20 times greater than the actual applied loads. ✓ Clips have been designed to eliminate the critical peel condition. Processes and techniques have been changed to exercise the greatest care during bonding. A sample is made using each batch of material and this sample pulled to destruction. Random and sine wave vibration tests plus shock tests conducted to date have produced no failures of adhesive bonded clips. ✓

Failure information from the Instrument Unit is being forwarded to DAC for their information and recommendations. The S-IVB Office and appropriate R&D Laboratories are conferring with Douglas to determine if changes to the test program are necessary. Vibration and shock investigations will be emphasized. ✓

Attachment: Notes 5/3/65 Rudolph (DIR, I-DIR, and R-DIR's copy only)

NOTES-5-24-65-SHEPHERD

B 5/29

Negative Report

P 5/24

1. PEGASUS A: Very surprisingly, the memory seems to have recovered; recent memory data are again good. Also, the radiation sensor appears to be operating again. ✓

The unbiased detector panels were disconnected because of failure of the 10 microfarad blocking capacitor. They had not indicated any radiation-induced signals over a three month lifetime. ✓

It has been determined that all the presently observed precession of the Satellite can be accounted for by gravity gradient torques. ✓

2. AES PROGRAM: Contractor replies to the last four RFP'S of our FY 1965 AES Program (Environmental Effects on Instruments; Surface and Subsurface Probes; Lunar Drill; Emplaced Scientific Station) are expected next week. We anticipate that contracts on all of our '65 tasks will be let in the near future.

Our proposed '66 study program in the same general area (Scientific Support for Lunar Surface Exploration) will cover 13 different tasks, some of them continuations of 1965 tasks. These tasks have been individually approved by our AES Project Office, and by members of OMSF and OSSA. ✓

3. POTENTIAL PAYLOADS FOR SAT IB AND SAT IB-CENTAUR: Dr. Mueller, on several recent occasions, made a strong plea for payloads for SAT IB and SAT V. You may recall some of the presentations that RPL gave during past months on potential payloads for unmanned SAT IB Satellites, among them Energy Conversion, Voice Broadcasting, TV Broadcasting, Optical Technology, and Meteoroid Technology. Recent progress in Solar-electric Systems, which makes 10 kW<sub>e</sub> converters appear possible, lends further support to these projects. We will include part of our study work in our June 3 presentation to you. We expect that a closely coordinated joint effort between FPO and RPL in this area of SAT IB payloads will develop in the near future.

4. ASTRONOMY LECTURES: Dr. W. Tifft, a young professor of astronomy and potential scientist-astronaut, gave two excellent lectures on space astronomy. He developed powerful arguments for a manned optical observatory on the lunar surface (first 12", then 40", then 100"). ✓

E.S.  
Our  
dis-  
cussion  
with GEM  
in the  
blackhouse  
during  
SA-8  
night.  
B